

Relationship between Risk Perception for Complications and Self-Management of Insulin Treatment in Individuals with Type 2 Diabetes: Cross-Sectional Study

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ABSTRACT

Background: Complications are common in individuals with Type 2 Diabetes Mellitus (T2DM) when effective disease management is not achieved. One factor that may be related to disease management is risk perception. Risk perception can influence an individual's health behaviors.

Aim: The study was conducted to determine the relationship between the risk perception of complications in individuals with T2DM and insulin treatment self-management.

Methods: The research was conducted in a descriptive and correlational type. The study was conducted at a university hospital between September 15, 2023, and January 30, 2024, with individuals diagnosed with T2DM. The study included 287 individuals. Data were collected using the Patient Identification Form, the Risk Perception Scale for Diabetes Mellitus (RDS-DM), and the Insulin Therapy Self-Management Scale (ITSM).

Results: The participants' mean risk knowledge score in RPS-DM was 2.80 ± 0.33 , the mean composite risk perception score was 2.39 ± 0.43 and the total mean score of ITSM was 115.19 ± 19.14 . It was determined that the risk knowledge of individuals with T2DM was weakly positively correlated with ITSM ($r=0.215$; $p<0.01$). It was observed that the risk perception regarding complications was positively correlated with the behavioral and cognitive sub-dimension mean scores of the ITSM ($p<0.05$).

Conclusion: Based on the scores obtained from the scales, it was determined that individuals with T2DM had high knowledge of complications, high risk perception, and above-average insulin treatment self-management levels. Furthermore, it was determined that risk perception regarding complications is related to insulin therapy self-management in behavioral and cognitive dimensions. It is important for nurses to provide training and follow-up to ensure that individuals continue correct and appropriate insulin treatment.

Keywords: Type 2 diabetes; Complication; Risk perception; Insulin treatment; Self-management

Introduction

Type 2 diabetes mellitus (T2DM) is a chronic disease that develops as a result of a metabolic disorder with a multisystem effect, characterized by an increase in blood glucose levels due to insulin hormone deficiency or resistance of peripheral tissues to insulin action [1]. The incidence of T2DM is increasing worldwide and has become a global problem that threatens the entire world. In particular, due to persistently high blood glucose levels, many serious complications such as cardiovascular and peripheral artery disease, cerebrovascular diseases, nephropathy, retinopathy, neuropathy and amputation due to diabetic foot occur in patients in the long term [1,2].

From the moment they receive their diagnosis, individuals diagnosed with T2DM must create a fresh way of life to successfully control the condition, avert complications, and uphold their quality of existence. The way these patients perceive risks related to the disease plays a crucial role in their adjustment to this new way of living [3,4]. Risk perception is the sensitivity of an individual to engage in healthy behavior against the threat of deterioration in their health. This may be true for diabetes, as it is for many chronic diseases [5]. A heightened sense of accurate risk awareness can motivate individuals to participate in protective actions and promote healthy habits such as nutritious eating and sufficient physical activity [4,6,7].

In the literature, studies have determined that the risk perception towards the disease and the development of complications in diabetic individuals affects well-being, symptoms, emotional state, diet, exercise and medication compliance, self-care behaviors, emotional disorder status and depression [8-12]. Inaccurate risk perception is a significant obstacle to the adoption of self-care behaviors and may pose an additional risk of negative consequences [3]. Increasing risk perception and taking effective measures to protect against these complications can help individuals improve their diabetes management and live a healthier life [13]. In this context, it has been emphasized that evaluating risk perception in diabetic individuals will be beneficial in controlling diabetes and protecting against complications [14]. It is important for nurses to use their educational role in this regard.

Self-management is indispensable in achieving the desired glycemic control in diabetic patients and thus preventing complications [15-17]. Self-management is a concept used to define individuals' own responsibilities in protecting and maintaining health [18]. The content of self-management skills includes regular blood sugar monitoring, increasing the amount of physical activity, creating a nutrition program suitable for the individual, and avoiding behaviors that may pose a risk [19]. In addition, self-management skills for T2DM include the ability to manage this treatment, especially in patients using insulin [15,20].

Insulin achieves its effectiveness solely when administered properly. Misapplication of insulin can result in absorption failures, stiffening of the injection site, and, crucially, an inability to manage blood glucose levels within the target range [21,22]. Self-management skills in insulin management include setting the correct insulin dose according to blood glucose, selecting the appropriate needle size, selecting the insulin injection site, applying the correct injection technique, and effectively performing insulin storage conditions [15,22]. Most patients do not administer insulin effectively and correctly, which increases complications [21]. Therefore, it would be an important approach for nurses to address the factors that may affect their self-management skills in insulin management.

Engaging in self-care practices is crucial for those with diabetes to effectively manage T2DM, and how individuals

perceive risk is believed to significantly impact this behavioral aspect. It is anticipated that having a clear understanding of risks will aid in the management of diabetes and help minimize complications related to the condition [23]. In order to determine/ implement the necessary nursing interventions for patients with diabetes, it is important to determine the symptoms experienced by patients, their risk perceptions for complications, and their perceptions of insulin self-management. In this context, this study was planned to determine the risk perception for complications and insulin treatment self-management in individuals diagnosed with T2DM and to reveal the relationship between risk perception for complications and insulin treatment self-management. This study will contribute to health professionals and literature in terms of evaluating the awareness of complications in T2DM patients and especially revealing the related factors in the development of insulin management skills.

Methods

The type of the study

The research was conducted in a descriptive and correlational type.

The universe and sample of the study

The universe of the study consisted of individuals who applied to the endocrine outpatient clinic of a university hospital with a diagnosis of type 2 diabetes between 15.09.2023 – 30.01.2024. An average of 700 individuals with a diagnosis of type 2 diabetes applied to the endocrine outpatient clinic of the hospital where the study was conducted in the last three months. Using a known sample size calculation formula and taking a p-value of 0.05 to maximize sample size, the sample size for the study was determined to be 249 ($n = N \cdot t^2 \cdot p \cdot q / d^2 \cdot (N - 1) + t^2 \cdot p \cdot q$ [$t = 1.96$; $p = 0.05$; $d = 0.05$; $q = 0.95$]). Considering that there may be losses in the study, the sample size was increased by 10% and it was planned to include at least 274 individuals with T2DM in the study. In this context, 287 individuals who were diagnosed with type 2 diabetes for at least six months, aged 18 years and over, at least literate, using insulin treatment, had no verbal communication barriers, and were willing to participate in the study were included in the sample. Diabetic individuals who did not use insulin in T2DM treatment, had more than one chronic complication due to diabetes, were unable to communicate verbally, and did not agree to participate in the study were excluded from the study.

Data collection tools

Data were obtained using the Patient Identification Form, Risk Perception Scale-Diabetes Mellitus (RPS-DM) and Insulin Treatment Self-Management Scale.

Patient Identification Form; The form, which was created by researchers in line with the literature, consists of two sections and 25 questions: socio-demographic (age, height, weight, gender, marital status, educational status, etc.) and disease-related (diabetes diagnosis period, diabetes type, diabetes diagnosis method, presence of additional chronic disease, diabetes treatment, regular medication use, etc.) variables [14,23,24].

Risk Perception Scale-Diabetes Mellitus; The research on the Turkish version's validity and reliability for the scale created by Walker in 2007 was carried out by Yilmaz and colleagues [14,24]. This scale is the pioneer tool designed to assess awareness of diabetes complications and associated risk perception. It comprises 25 questions and features two main areas: "risk knowledge" and "composite risk perception."

Within the composite risk perception area, there are four parts: "concern," "optimism," "personal disease risk," and "environmental risk." A higher score reflects a greater perceived risk of complications related to diabetes. In this research, the Cronbach alpha coefficients were determined to be 0.78 for the risk knowledge area and 0.87 for the composite risk perception area, respectively.

Insulin Treatment Self-Management Scale; The scale developed by Karahan Okuroglu and his colleagues in 2019 consists of 32 items [15]. The scale is a 5-point Likert type and has three sub-dimensions. An increase in the score obtained in all sub-dimensions should be evaluated as an increase in the level of self-management related to the relevant dimension. In the study by Karahan Okuroglu and his colleagues, the Cronbach alpha internal consistency coefficient was found to be 0.91 [15]. In this study, the Cronbach alpha value of the scale was determined as 0.92.

Data evaluation

Data were interpreted in SPSS 29.0 package program (IBM SPSS, USA). Descriptive statistical methods (percentage, mean, standard deviation) were used in the distribution of sociodemographic and disease-related characteristics of individuals with T2DM. Student t test and One-Way ANOVA (Bonferroni test as a post hoc test) were used to compare some characteristics of patients with RPS-DM and Insulin Treatment Self-Management Scale; Pearson correlation analysis was used to examine the relationship between the scales. Significance was evaluated as $p < 0.05$ in statistical evaluation.

Ethics committee approval

Before collecting the data, written permission was obtained from the XXX University Non-Interventional Ethics Committee (Decision no: 2023-09/03; Date: 21.09.2023) and the hospital where the study was conducted (Decision no: 349152). In addition, informed consent was obtained from each individual who would participate in the study regarding the content of the study and the voluntary nature of participation. The study was conducted in accordance with the Declaration of Helsinki Principles.

Results

The average age of individuals with T2DM is 61.04 ± 11.82 years, and 38.7% are 65 years of age or older. 59.2% of the participants are female, 73.2% are married, 43.2% are secondary school graduates, 81.2% are unemployed, and 86.1% evaluate their economic status as moderate. When the body structure of the participants is examined according to their BMI values, it was determined that 42.2% are overweight and 37.6% are obese. 10.8% of individuals with T2DM currently smoke and 1% consume alcohol. The characteristics of the participants regarding their disease are shown in Table 1.

It was observed that the risk knowledge sub-dimension mean score of individuals with T2DM in RPS-DM was 2.80 ± 0.33 and that their risk knowledge regarding complications was at a good level. The composite risk perception sub-dimension mean score of the scale was 2.39 ± 0.43 and the perceived risk level was above average. In addition, it was determined that the anxiety levels (2.95 ± 0.82) and personal disease risk (2.46 ± 0.93) of the participants were above average; optimism (2.09 ± 0.72) and environmental risk perception (2.04 ± 0.92) were at a moderate level. The total mean score of individuals with T2DM on the ITSM Scale was 115.19 ± 19.14 , and considering the minimum

Table 1

Disease-related characteristics of individuals with T2DM

Features		Mean $\pm$ SD	
Disease duration (years) (Mean $\pm$ SD)		13.69 $\pm$ 9.09	
HbA1c (%) (Mean $\pm$ SD)		9.87 $\pm$ 2.16	
		n	%
Presence of other chronic diseases	Yes	163	56.8
	No	124	43.2
How to diagnose diabetes	When you go for a check-up for another reason	134	46.7
	Coincidentally, with blood sugar measurement	36	12.5
	When you apply to a healthcare facility due to symptoms of diabetes such as dry mouth and thirst	117	40.8
Types of diabetes treatment	Oral antidiabetic + insulin	115	40.1
	Insulin	172	59.9
Regular use of medications	Yes	228	79.4
	Partially	49	17.1
	No	10	3.5
Regular diet	Yes	153	53.3
	Partially	97	33.8
	No	37	12.9
Regular exercise	Yes	72	25.1
	Partially	120	41.8
	No	95	33.1
Diabetes control frequency	Monthly	24	8.4
	Three months	152	53.0
	Six months	47	16.4
	Yearly	19	6.6
	Irregular	45	15.7
Diabetic retinopathy	Yes	57	19.9
	No	230	80.1
Diabetic nephropathy	Yes	37	12.9
	No	250	87.1
Diabetic Neuropathy	Yes	46	16.0
	No	241	84.0
Diabetic foot	Yes	45	15.7
	No	242	84.3

Table 2

Distribution of mean scores of the RPS-DM and Insulin Treatment Self-Management Scale

Scales	Minimum and maximum points available	Minimum points marked	Mean $\pm$ SD
RPS-DM			
Risk information	0-3	0-3	2.80 $\pm$ 0.33
Compound risk perception	1-4	1-3.67	2.39 $\pm$ 0.43
Anxiety	1-4	1-4	2.95 $\pm$ 0.82
Optimism	1-4	1-4	2.09 $\pm$ 0.72
Personal disease risk	1-5	1-4.11	2.46 $\pm$ 0.93
Environmental risk	1-4	1-4	2.04 $\pm$ 0.92
Insulin Treatment Self-Management Scale	32-160	57-159	115.19 $\pm$ 19.14
Behavioral	17-85	21-84	64.89 $\pm$ 11.10
Cognitive	7-35	7-35	23.14 $\pm$ 6.12
Affective	8-40	8-40	27.15 $\pm$ 8.13

Table 3

Distribution of responses of individuals with T2DM to statements regarding the risk of having diabetes-related health problems

Health problems related to diabetes	Almost no risk		Slight risk		Medium risk		High risk	
	n	%	n	%	n	%	n	%
Heart attack	80	27.9	58	20.2	66	23.0	83	28.9
Foot amputation	118	41.1	57	19.9	44	15.3	68	23.7
Cancer	146	50.9	60	20.9	36	12.5	45	15.7
Vision problems	49	17.1	70	24.4	70	24.4	98	34.1
High blood pressure	34	11.8	60	20.9	70	24.4	123	42.9
Numb feet	36	12.5	66	23.0	66	23.0	119	41.5
Stroke	115	40.1	63	22.0	40	13.9	69	24.0
Blindness	111	38.7	70	24.4	36	12.5	70	24.4
Kidney failure	92	32.1	73	25.4	42	14.6	80	27.9

and maximum scores that could be obtained (32-160), it was determined that the self-management level in behavioral, cognitive and affective areas was above average (Table 2).

Table 3 shows the distribution of responses given by individuals with T2DM to the personal disease risk section in the RPS-DM. Accordingly, it was determined that participants perceived complications such as heart attack (28.9%), high blood pressure (42.9%) and numb feet (41.5%) as higher risks.

When some characteristics of individuals with T2DM were compared with the RPS-DM score averages, it was seen that age was very weakly negatively correlated with the level of optimism and very weakly positively correlated with personal disease risk perception. It was determined that the duration of the disease was very weakly positively correlated with the composite risk perception for complications. It was also found that the HbA1c level was very weakly negatively correlated with anxiety and very weakly positively correlated with optimism ($p<0.05$). According to BMI, it was found that the optimism level was lower in patients with obese body structure. It was also seen that the personal disease risk perception was higher in individuals with other chronic diseases. In addition, the anxiety level was found to be lower in individuals using oral antidiabetic and insulin compared to individuals using only insulin. It was determined that the anxiety level was higher in patients who had their diabetes checked regularly and the personal disease risk perception was higher in those who had their diabetes checked every one to three months ($p<0.05$). However, Bonferroni correction revealed that patients who had their diabetes checked at different times had similar levels of anxiety. Apart from these variables, it was found that gender and education status were not related to the risk perception for complications ($p>0.05$).

When some characteristics of T2DM individuals using insulin treatment were compared with the RPS-DM score averages, it was determined that age was negatively correlated with insulin treatment self-management. In addition, it was determined that behavioral insulin self-management was high in male patients. Insulin treatment self-management levels were found to be higher in participants with higher education level compared to other groups ($p<0.05$). Also, obese participants were found to have lower levels of self-management of insulin therapy ($p<0.05$). However, it was determined that there was no relationship between disease duration, HbA1c level, presence of other chronic diseases, diabetes treatment type and diabetes

control frequency and insulin treatment self-management ($p>0.05$) (Table 4).

In the study, when the mean scores of T2DM individuals were compared with the RPS-DM and Insulin Treatment Self-Management Scale, it was determined that risk knowledge was weakly positively correlated with insulin treatment self-management ($r=0.215$; $p<0.001$). It was found that risk knowledge was associated with both behavioral and cognitive sub-dimensions ($p<0.01$).

In the study, it was observed that the participants' risk perception regarding complications in diabetes was positively correlated with the behavioral and cognitive sub-dimension mean scores of the Insulin Treatment Self-Management Scale ($p<0.05$). However, it was observed that the anxiety and personal disease risk sub-dimensions in the risk perception regarding complications were not associated with insulin treatment self-management ($p>0.05$) (Table 5).

Discussion

T2DM is a public health problem that is increasingly common, requires lifelong follow-up and treatment, and can cause many complications, and imposes a serious financial burden on the health system [1]. In order to prevent these problems or detect them at an early stage, it is of great importance for individuals to be informed about T2DM complications and to comply with treatment [25]. This study was planned to determine the perception of risk for complications and self-management of insulin therapy in individuals diagnosed with T2DM, and to reveal the relationship between the perception of risk for complications and self-management of insulin therapy.

In the management of diabetes requiring continuous medical care, the knowledge level of patients is very important to reduce the risk of developing acute and chronic complications [1]. In the study, it was determined that the risk knowledge of complications in individuals with T2DM was at a good level. This finding is consistent with the findings of many studies [12,13,19,24-27]. The high knowledge of the risk of complications in individuals with T2DM may be due to the diabetes education given to patients. This shows that individuals with T2DM have high awareness of diabetes-related complications.

Risk perception in individuals with T2DM may negatively affect diabetes self-management and may pose a real risk for the development of diabetes complications [12]. In this study, it was determined that the perceived risk level in individuals with T2DM was above average. However, it was observed that participants' anxiety and personal risk perception, which shape their perception of the risk of complications, were higher than other components. While the findings of three studies conducted in Turkey were similar to the findings of this study [23,25-27], in other studies, the perceived risk level for diabetes complications was determined to be moderate [13,23]. In a study conducted in China, it was found that patients' perceived personal risks in terms of risk perceptions regarding complications were mild to moderate, their personal risk control and optimism levels were moderate, and their anxiety levels were moderate to high [5]. In a systematic review examining the risk perception of complications in individuals with T2DM, it was stated that the participants had low risk awareness and optimistic bias [3]. In a study conducted with African American individuals with T2DM, it was determined that the risk perception for diabetes complications was low [8]. It is thought that the difference in the research findings may be due to differences in factors such as the age range, educational status, cultural characteristics, and diabetes education status of the individuals included in

Table 4

Comparison of mean scores on the RPS-DM and Insulin Treatment Self-Management Scale for certain characteristics and disease-related features in individuals with T2DM

Features	Risk Information	Composite Risk Perception					Insulin Treatment Self-Management Scale			
		General	Anxiety	Optimism	Personal disease risk	Environmental Risk	General	Behavioral	Cognitive	Affective
	r; p	r; p	r; p	r; p	r; p	r; p	r; p	r; p	r; p	r; p
Age (years)	-0.081;									
0.172	0.074; 0.214	0.018; 0.756	-0.186; 0.002	0.302; <0.001	-0.037; 0.537	-0.297; <0.001	-0.300; <0.001	-0.274; <0.001	-0.086; 0.147	
Duration of illness (years)	-0.014; 0.813	0.143; 0.016	0.046; 0.438	-0.129; 0.028	0.187; 0.001	0.142; 0.016	0.008; 0.897	-0.040; 0.501	-0.030; 0.618	0.095; 0.109
HbA1c (%)	-0.001; 0.990	0.036; 0.567	-0.139; 0.027	0.128; 0.049	0.021; 0.739	Obez				
0.072; 0.256	0.072; 0.256	-0.001; 0.989	0.032; 0.612	-0.034; 0.588	-0.017; 0.791					
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Gender										
Female	2.79±0.35	2.42±0.43	2.99±0.83	2.11±0.76	2.53±0.92	2.06±0.92	113.43±19.77	63.60±11.41	22.87±6.64	26.96±7.86
Male	2.83±0.28	2.33±0.43	2.88±0.80	2.07±0.67	2.36±0.95	2.02±0.93	117.76±17.97	66.76±10.40	23.55±5.27	27.43±8.54
t; p	-1.071; 0.285	1.725; 0.086	1.141; 0.255	0.482; 0.630	1.510; 0.312	0.347; 0.729	-1.889; 0.060	-2.396; 0.017	-0.931; 0.353	-0.481; 0.631
Educational Status										
Literate (a)	2.71±0.38	2.41±0.38	2.99±0.75	2.13±0.82	2.39±0.96	2.13±0.87	107.53±24.56	59.50±14.52	21.33±8.53	26.69±9.75
Primary Education (b)	2.85±0.30	2.38±0.42	2.93±0.84	2.06±0.72	2.67±0.97	1.87±0.87	109.78±17.95	62.78±9.30	21.54±6.27	25.45±8.28
Secondary Education (c)	2.80±0.33	2.40±0.45	2.93±0.82	2.10±0.67	2.47±0.89	2.09±0.95	118.66±17.14	66.36±9.90	24.33±4.63	27.95±7.55
Higher Education (d)	2.88±0.24	2.33±0.47	2.95±0.87	2.07±0.73	2.30±0.95	2.02±0.94	121.36±13.62	69.68±8.39	24.06±5.19	27.62±7.25
F; p	2.813; 0.040 (a=b=c=d)	0.331; 0.803	0.056; 0.982	0.127; 0.944	1.546; 0.203	0.922; 0.430	8.153; <0.001 (c=d>a=b)	9.724; <0.001 (c=d>a=b)	5.072; 0.002 (a=b=c=d)	1.350; 0.258
Body structure according to BMI										
Normal weight (a)	2.83±0.31	2.38±0.44	3.06±0.62	2.37±0.70	2.18±0.99	1.92±0.43	114.08±17.63	64.87±11.91	23.96±5.03	25.24±8.70
Overweight (b)	2.85±0.28	2.34±0.43	2.85±0.86	2.07±0.74	2.45±0.91	2.00±0.94	119.44±18.56	67.31±10.40	23.83±5.98	28.29±7.97
Obese (c)	2.75±0.38	2.44±0.43	3.00±0.85	1.98±0.67	2.63±0.90	2.15±0.94	111.03±19.72	62.18±11.19	21.94±6.64	26.90±7.87
F; p	2.892; 0.057	1.351; 0.261	1.692; 0.186	5.755; 0.004 (a=b>c)	4.513; 0.012 (a=b=c)	1.348; 0.261	5.816; 0.003 (a=b>c)	6.315; 0.002 (a=b>c)	3.420; 0.034 (a=b=c)	2.883; 0.058
Presence of other chronic diseases										
Yes	2.79±0.34	2.42±0.42	2.93±0.85	2.06±0.73	2.63±0.88	2.06±0.92	113.39±20.08	63.88±11.43	22.63±6.57	26.86±8.45
No	2.82±0.30	2.34±0.45	2.97±0.77	2.13±0.71	2.25±0.96	2.02±0.92	117.57±17.64	66.20±10.55	23.82±5.43	27.54±7.72
t; p	-0.822; 0.412	1.474; 0.142	-0.369; 0.712	-0.804; 0.422	3.443; <0.001	0.328; 0.743	-1.840; 0.067	-1.760; 0.079	-1.628; 0.105	-0.696; 0.487
Diabetes treatment method										
Oral antidiabetic + insulin	2.80±0.34	2.40±0.40	2.82±0.76	2.18±0.73	2.51±0.91	2.07±0.92	114.26±18.79	64.00±10.99	22.69±6.11	27.55±7.99
Insulin	2.81±0.32	2.38±0.46	3.03±0.84	2.04±0.71	2.43±0.95	2.02±0.92	115.82±19.41	65.48±11.16	23.45±6.12	26.88±8.24
t; p	-0.035; 0.972	0.325; 0.745	-2.124; 0.035	1.627; 0.105	0.764; 0.446	0.444; 0.658	-0.678; 0.498	-1.102; 0.271	-1.027; 0.307	0.680; 0.497
Diabetes control frequency										
Once every three months (a)	2.78±0.34	2.36±0.45	2.88±0.85	2.03±0.72	2.57±0.98	1.98±0.92	113.34±20.79	64.10±11.69	22.53±6.56	26.69±8.32
Once every six months/year (b)	2.82±0.32	2.38±0.41	2.92±0.80	2.20±0.72	2.38±0.88	2.04±0.93	118.57±17.11	65.65±11.04	24.18±5.89	28.74±7.72
Irregular (c)	2.87±0.25	2.48±0.39	3.25±0.63	2.20±0.72	2.18±0.77	2.28±0.87	117.51±13.94	66.84±8.37	24.04±4.11	26.62±7.87
F; p	1.290; 0.277	1.229; 0.294	3.798; 0.024 (a=b=c)	1.910; 0.150	3.426; 0.034 (a=b=c)	1.941; 0.145	2.202; 0.113	1.292; 0.276	2.328; 0.099	1.635; 0.197

Table 5

Comparison of Mean Scores of Insulin Treatment Self-Management Scale with RPS-DM in Individuals with T2DM

Insulin Treatment Self-Management Scale	Risk information	Compound risk perception				
		General	Anxiety	Optimism	Personal disease risk	Environmental Risk
	r; p	r; p	r; p	r; p	r; p	r; p
Behavioral	0.198; <0.001**	0.137; 0.020*	0.080; 0.178	0.069; 0.247	0.015; 0.804	0.122; 0.039*
Cognitive	0.210; <0.001**	0.174; 0.003*	0.094; 0.112	0.206; <0.001**	-0.095; 0.107	0.183; 0.002*
Affective	0.077; 0.192	-0.073; 0.220	-0.119; 0.045	0.047; 0.427	-0.093; 0.115	0.025; 0.675
General	0.215; <0.001**	0.105; 0.077	0.026; 0.663	0.126; 0.033*	-0.062; 0.298	0.140; 0.018*

the sample group. However, the findings obtained in this study reveal that the risk knowledge regarding complications is high in individuals with T2DM, but the need to evaluate risk perception. The study found that patients with T2DM perceived complications such as heart attack, high blood pressure, and numb feet as riskier. In the research conducted by Kumsar et al. it was revealed that individuals regarded issues like heart attack, hypertension, and eyesight difficulties as posing greater risks [27]. The study finding is consistent with the literature. This finding may be due to the frequent occurrence of complications parallel to the prevalence of diabetes and the individual and technological information provided about the development of complications.

In the study, it was found that as age was weakly negatively associated with optimism levels and positively associated with personal disease risk perception in individuals with T2DM. In addition, HbA1c level is very weakly negatively correlated with anxiety and positively correlated with optimism; obese patients have lower levels of optimism; individuals with other chronic diseases have higher personal disease risk perception; and patients using oral antidiabetic drugs and insulin have lower levels of anxiety. There are a limited number of studies in the literature examining variables associated with risk perception for complications [13,23,25,27]. For example, in the study by Bila and Yilmaz, it was found that the complication risk perception level of those with additional chronic diseases was significantly higher than those without [25]. In the study of Kumsar et al., it was determined that risk perception decreases as age increases, risk perception increases as education level increases, and HbA1c level is positively correlated with anxiety [27]. In the study of Saglam and Bektas, it was determined that risk perception for complications is higher in women, and risk perception increases as age increases [23]. In the literature, it is seen that the characteristics of individuals with T2DM differ in their relationship with risk perception for complications. This may be due to the characteristics of the individuals included in the sample or the number of samples.

In T2DM, insulin treatment is initiated when acute and chronic complications occur and glycemic control deteriorates for various reasons [28]. Ensuring that diabetic individuals have self-care skills, such as being able to continue insulin treatment on their own and gaining the ability to administer insulin, has become one of the main goals in diabetes management [15,21]. In the study, it was determined that the insulin treatment self-management level of individuals with T2DM was partially good in behavioral, cognitive and affective areas. There is no study in the literature using a similar measurement tool. However, in the studies conducted, it was seen that T2DM patients using insulin had a high level of negative perception towards insulin use [23,28]. In a study examining diabetes self-care management practices in patients using insulin, it was determined that diabetes

self-care should be improved for patients using insulin [17]. The findings of this study reveal the need to improve the insulin treatment self-management skills of individuals with T2DM.

The study found a positive correlation between risk awareness regarding complications and self-management of insulin therapy in individuals with T2DM. Although there is no similar study in the literature, it can be said that the finding obtained in this study is an expected situation. In fact, patients who are aware of the complications that may arise due to diabetes are expected to be careful about their treatment in order to prevent these complications. In this respect, the study finding reveals the importance of disease education in the implementation of self-care skills regarding treatment.

Individuals' perception levels can affect their behaviors towards diabetes management [9,26]. One of the important points we reached with this study is that as the risk perception of individuals with T2DM regarding complications increases, their self-management of insulin treatment in behavioral and cognitive dimensions also increases. Although there is no similar study in the literature, there are studies in which the risk perception for complications is related to the perception of insulin treatment and diabetes self-management. For example, Sağlam and Bektaş found that there was a negative relationship between the perception of risk regarding complications and the perception of insulin treatment evaluation; patients with low risk perception had higher negative attitudes towards insulin treatment [23]. Aytemur and Inkaya found that as individuals' complication risk perception increased, their diabetes self-management increased [19]. In a study conducted with Chinese individuals with T2DM, risk perception was determined to be significantly associated with each health-enhancing self-care behavior [5]. Another study emphasized that perceived risk is related to diet, exercise, and medication compliance in diabetes and supports self-care behaviors (9). Despite these studies, Rashidi and Kiskac found that risk perception for complications was not associated with self-management in diabetes [13]. Bila and Yilmaz found that risk perception increased while treatment compliance decreased [25]. In line with the studies conducted, the contribution of our study finding to the literature is important due to the different findings and especially the fact that insulin treatment self-management was not addressed in the studies. There is a need for studies examining the risk perception for complications in individuals with T2DM and insulin treatment self-management.

Limitations

Since the study was conducted in a single public hospital and within a specific time period, the sample size is limited. In addition, participants' risk perceptions for complications and insulin treatment self-management levels are based on the self-reporting of individuals according to the items included in

the scales. Variables such as insulin treatment dose and insulin administration skills of individuals with T2DM were not included in the study. Also, patients with multiple diabetes-related complications were not included in the study, as this could alter risk perception. However, our study is the first to examine the risk perception for complications determined to be associated with insulin treatment self-management. It is believed that it will guide health professionals in insulin treatment management.

Conclusion

Based on the scores obtained from the scales, it was determined that individuals with T2DM had high knowledge of complications, high risk perception, and above-average insulin treatment self-management levels. Participants' knowledge of the risk of complications was found to be related to self-management of insulin therapy. Furthermore, risk perception was found to be positively correlated with self-management in both behavioral and cognitive dimensions.

These findings are important for the effective management of treatment in individuals with T2DM. Therefore, to provide comprehensive care to individuals with diabetes, a care approach provided by nurses that addresses patients holistically, plans care specifically for each individual, and focuses on improving the individual's insulin self-management is crucial. It is important for nurses to educate patients on providing accurate risk perception regarding complications in individuals with T2DM.

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