Determination of Psychological Insulin Resistance and Self-Care in Type 2 Diabetic Patients with and Without Insulin Use

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Abstract

Diabetes Mellitus is a world-wide important is a public health issue. It is known that individuals with type 2 diabetes often have negative thoughts or feelings about starting, using, or intensifying insulin. This study was conducted to determine psychological insulin resistance and self-care in type 2 diabetes patients who use and do not use insulin. This descriptive, correlational study focused on type 2 diabetes mellitus patients receiving treatment in the internal medicine clinics of a provincial state hospital. No sample selection was used in the study; 200 type 2 diabetes mellitus patients who met the inclusion criteria volunteered to participate. Data were collected using a descriptive characteristics form, the Psychological Insulin Resistance Scale (PIRS), and the Diabetes Self-Care Scale (DSCS). It was determined that of the patients participating in the study; 79% were female, 39% were between the ages of 51-60, 97.5% were married, and 83% had an educational status of illiterate. The mean PIRS score of patients using insulin was 24.11±5.14; the mean DSCS score was 72.27±19.60; the mean PIRS score of patients not using insulin was 48.06±8.10; and the mean DSCS score was 86.83± 22.39 . Among the patients using insulin, it was determined that PAS was lower in patients who were primary school graduates, unemployed, smokers, had an additional chronic disease, had a disease duration of 10 years or more, did not receive diabetes education, and were overweight. Insulin-using patients had low PIRS levels, and their self-care was below acceptable levels. Non-insulin-using patients had above-average PIRS levels, and their self-care was at acceptable levels. It was determined that as insulin resistance increased, patients' self-care levels decreased. Strategies and policies aimed at improving the self-care levels of patients with type 2 diabetes may be recommended.
Keywords: Self-Care, Psychological Insulin Resistance, Type 2 Diabetes, Nursing

Introduction

Diabetes Mellitus (DM) is a major disease worldwide. It is a public health problem, affecting an estimated 415 million individuals and projected to rise to 642 million by 2040 (IDF, 2020 ; Global Burden of Disease Collaborative Network, 2019). There are approximately 7 million diabetic patients in Turkey between the ages of 20 and 79. This figure corresponds to approximately 15% of the total adult population, and type 2 diabetes is considered an 80% preventable disease (TURKDIAB, 2023).

Individuals with type 2 diabetes are often known to have negative thoughts or feelings about initiating, using, or intensifying insulin. This is also known as 'psychological insulin resistance' (PIR) or 'negative insulin appraisal' (www.diabetes.org.uk, 2023). Psychological insulin resistance (PIR) is defined as the psychological resistance to insulin use in individuals with diabetes. It describes the barriers that both physician and patient face initiating and maintaining insulin therapy (Allen et al., 2017). While insulin is suitable for those with severe diabetes, PIR patients believe that a new insulin treatment will have a negative impact on their disease. Individuals with diabetes view insulin use as a sign of worsening diabetes rather than as an important next step in treatment (Batais and Schantter, 2016). One study shows that some patients believe that poor past self-management led to their need for insulin and accused healthcare professionals of failing to explain the risks and benefits of insulin. Therefore, psychological insulin resistance in patients with type 2 diabetes has been reported to hinder or delay treatment (Holmes- Truscott et al., 2017). Learning to live with diabetes is crucial in diabetes management, which in turn depends on the diabetes' success in self-care (Karadakovan and Eti Aslan, 2020).

Self-care is the practice of individuals taking care of themselves to maintain and improve their health (WHO, 2020). Before administering insulin therapy to patients with type 2 diabetes, appropriate education and practices should be provided to reduce psychological insulin resistance. Patients can perform the necessary self-care themselves after overcoming psychological insulin resistance (Funnell et al., 2014). Therefore, a plan to reduce psychological insulin resistance should be included in insulin self-injection training for patients with type 2 diabetes. A stepwise approach to self-care is necessary to ensure that patients with type 2 diabetes are monitored from the onset of the disease and helped to overcome their psychological aversion to insulin (Tütün Yümin et al., 22017).

Type 2 diabetes is a chronic disease that is increasingly prevalent. The prospect of using insulin daily can increase patients' fears. Self-care is considered an important factor in preventing this fear. This study was designed to determine psychological insulin resistance and self-care in type 2 diabetes patients who use insulin and those who do not.

Research Questions

- What is the level of psychological insulin resistance in type 2 diabetes patients who use insulin and those who do not?
- Self-care in type 2 diabetes patients who use insulin and those who do not?

- Do disease-related characteristics of type 2 diabetic patients using and not using insulin affect psychological insulin resistance and self-care levels?
- Is there a relationship between psychological insulin resistance and self-care levels in type 2 diabetes patients who use and do not use insulin?

Methods

Type of Research: The research was conducted using descriptive and relational scanning methods.

Universe and Sample of the Research: The universe of the study consisted of all patients diagnosed with type 2 diabetes who applied to a state hospital in a province in the southeast of Turkey between December 2022 and July 2024 , while the sample consisted of 200 patients diagnosed with type 2 diabetes, aged 18 years and over, who were treated in the internal medicine clinic of the same hospital on the specified dates without any calculations, and who were using or not using insulin.

Data Collection Tools

Personal Information Form : It consists of thirteen questions in total, including the descriptive characteristics of the patients (age, gender, education, marital status, employment, income status) and the characteristics of the patients related to type 2 diabetes (disease duration, comorbidity, diabetes education, BMI and the presence of other diabetic patients in the household).

Psychological Insulin Resistance Scale (PIRS): The scale developed by Song et al. (2019) consists of 12 items and 3 subdimensions (Supportive factor, psycho -cognitive, and physical). Items (14,16,17, and 18) constitute the supportive factor; items (6,7,10, 11, and 12) constitute the psycho -cognitive dimension; and items (3, 8, and 9) constitute the physical dimension. Cronbach's alpha coefficient was determined to be 0.91. The Turkish validity and reliability study was conducted by Işık et al. (2021). The lowest score that can be obtained from the scale was 12, and the highest score was 60. A high score obtained from the scale indicates the person's level of psychological insulin resistance. Cronbach's alpha coefficient was determined to be 0.82. It is recommended that the PID Scale be used to determine whether type 2 diabetes patients have PID, and that the psychological problems that may occur during type 2 diabetes treatment should be evaluated by the professional healthcare team and the treatment should be handled multidisciplinary from the patient's perspective (Işık et al., 2021). The Cronbach alpha coefficient in this study is 0.913.

Diabetes Self-Care Scale : This scale was developed in the United States by Lee and Fisher in 2005 to measure the self-care activities of patients with type 2 diabetes (Lee and Fisher 2005). The validity and reliability study of the scale in Turkish was conducted by Karakurt and Kaşıkçı (2015). The scale consists of 35 items, identical to the original form except for a few item variations. The Turkish form of the scale, originally a 6-point Likert -type scale, was converted to a 4-point Likert- type scale based on Lee and Fisher's suggestions and expert opinions. The scale options were changed to "Never (1)," "Sometimes (2)," "Frequently (3)," and "Always (4)." Patients who scored above 66% of the scale were considered to have acceptable self-care. The lowest acceptable score for this scale, based on a 4-point Likert- type scale, was determined as 92 points. The maximum score on the scale is 140, and as this score increases, patients' ability to perform self-care activities increases positively. Research has found the total Cronbach's alpha coefficient for the scale to be 0.81 (Karakurt & Kaşıkçı, 2015). The Cronbach's alpha coefficient in this study was found to be 0.920.

Statistical Analysis of Data: During the coding, statistical analysis and evaluation of the data, IBM SPSS 24.0 (IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp) statistics package program was used. Demographic variables are given as number (n) and percentage (%), and scale measurements are given as mean (x) and standard deviation (SD). Normality analysis of scale measurement data between groups was checked with the Kolmogorov-Smirnov test and it was determined that they did not show a normal distribution in normality distributions. According to this result, Man-Whitney U test was applied for variables with two groups, and Kruskal- Wallis analysis was applied for more than two variables. Post hoc Tamhane's T2 test was applied to determine the difference between the statements found to be statistically significant as a result of the Kruskal -Wallis analysis and Pearson Correlation analysis were performed to determine the direction and level of the relationship between the scales. The statistical significance level was taken as 0.05 in all tests.

Ethical Aspects of the Research: Before commencing the study, approval was obtained from the Erzincan Binali Yıldırım University Human Research, Health, and Sports Sciences Ethics Committee (Date: 31/08/2022 - Protocol no : 07-08/09). Following Ethics Committee approval, permission for the study was obtained from the Diyarbakır Provincial Health Directorate and Selahaddin Eyyubi State Hospital. Participation in the study was voluntary. Participants were informed about the purpose and content of the study, and verbal consent was obtained from the volunteers. Participants were informed that the information obtained would not be disclosed to third parties and that they could withdraw from the study at any time.

Results

Insulin users included in the study of the patients, 90% were female, 39.8% were aged 51-60, all were married, 95.5% were illiterate, 52.3 % were unemployed, and it was determined that

51.1% of the patients had incomes less than their expenses. Of the patients not using insulin, 70.5% were female, 38.4% were between 51 and 60, 95.5 % were married, 73.2% were illiterate, 70.5% were unemployed, and 61.6% had incomes less than their expenses (Table 1).

Table 1. Distribution of Patients' Sociodemographic Characteristics (n=200)

Sociodemographic Characteristics	Patients using insulin (n:88)		Non-insulin users patients (n:112)	
	n	%	n	%
Age	(58.12±8.98)		(53.34 ±12.24)	
Under 40	0	0%	8	7.1
41-50 years old	20	22.7	30	26.8
51-60 years old	35	39.8	43	38.4
61-70 years old	20	22.7	24	21.4
71 and above	13	14.8	7	6.3
Gender				
Woman	79	89.8	79	70.5
Male	9	10.2	33	29.5
Educational background				
Illiterate	84	95.5	82	73.2
Literate	2	2.3	7	6.3
Primary school graduate	2	2.3	4	3.6
Secondary school graduate	0	0%	6	5.4
University and above	0	0%	13	11.6
Marital status				
Married	88	100.0	107	95.5
Single	0	0.0%	5	4.5
Working status				
It works	42	47.7	33	29.5
Doesn't work	46	52.3	79	70.5
Income perception status				
Income is less than expenses	45	51.1	69	61.6
Income equals expense	43	48.9	30	26.8
Income is more than expense	0	0.0%	13	11.6
Total	**88**	**100.0**	**112**	**100.0**

The mean PIRS score of patients using insulin was 24.11±5.14; the mean DSCS score was 72.27±19.60; the mean PIRS score of patients not using insulin was 48.06±8.10 and the mean DSCS score was 86.83±22.39 (Table 2).

Table 2. Patients' Psychological Insulin Resistance Scale (PIRS) and Diabetes Self-Care Scale (DSCS) Scale Mean Scores (n=200)

Scales	Insulin users patients (n: 88)				Patients who do not use insulin (n:112)			Total
	n	Mean±sd	Minimum	Max	Mean±sd	Minimum	Max	Mean±sd
Psychological Insulin Resistance Scale (PIRS)	200	24.11±5.14	12	33	48.06±8.10	33	60	37.52±13.79
Diabetes Self-Care Scale (DSSC)	200	72.27±10.93	49	88	86.83±22.39	37	125	80.42±19.60

Table 3. Comparison of Mean PIRS and DSCS Scores of Patients Using and Not Using Insulin According to Disease-Related Characteristics

Variables	n	PIRS of patients using insulin (n:88)	n	PIRS of patients not using insulin (n: 112)	DSCS of patients using insulin (n:88)	DSCS of patients not using insulin (n: 112)
Smoking status						
Yes	6	20.22±2.78	30	44.26±6.68	73.66±12.53	82.37±20.84
No	82	24.41±5.20	82	49.45±8.81	72.21±11.32	99.00±22.27
Test		**z: - 2,202**		**z: - 3.153**	z: -0.449	**z: - 2.986**
Meaningfulness		**p : 0.028**		**p : 0.002**	p : 0.618	**p : 0.003**
Another chronic disease condition other than diabetes						
Yes	72	23.72±4.34	60	48.58±8.10	71.44±11.84	84.46±17.80
No	16	25.87±7.75	52	47.46±8.14	76.36±3.34	89.55±26.55
Test		z: - 1,810		z: -0.959	**z: - 2.793**	z: -0.820
Meaningfulness		p : 0.070		p : 0.338	**p : 0.013**	p : 0.412
Diagnosis period						
1-3 years [(a)]	17	27.35±5.48	31	44.35±9.12	63.23±13.89	72.06±21.88
4-6 years [(b)]	13	26.23±3.32	24	48.50±5.06	78.38±1.19	102.87±21.97
7-9 years [(c)]	16	25.87±6.46	9	58.22±1.09	82.37±8.27	96.84±7.27
10 years and above [(d)]	42	21.47±3.43	48	48.33±7.76	72.27±10.93	92.06±16.23
Test		**χ2 : 25.62**		**χ2 : 21,539**	**□□: 29,679**	**□□: 27,743**
Meaningfulness		**p : 0.000**		**p : 0.000**	**p : 0.000**	**p : 0.000**
Status of receiving education about diabetes						
Yes	65	24.78±5.13	80	48.92±7.03	73.61±11.07	97.97±19.50
No	23	22.21±4.79	32	45.90±10.11	68.47±9.77	80.39±21.51
Test		**z: - 2,584**		**z: - 2,584**	**z: - 2.418**	**z: - 2,740**
Meaningfulness		**p : 0.010**		**p : 0.010**	**p : 0.016**	**p : 0.006**
BMI						
Weak [(a)]	4	25.00±4.21	31	48.29±8.12	79.11±10.23	92.60±20.29
Normal Weight [(b)]	26	25.53±6.40	71	47.97±8.14	66.61±12.23	80.03±17.79
Overweight [(c)]	58	23.41±4.57	10	48.06±8.10	64.34±9.72	89.43±23.49
Test		**χ2 : 4.89**		χ2 : 0.082	**□□: 7,527**	z: -0.881
Meaningfulness		**p : 0.041**		p : 0.774	**p : 0.023**	p : 0.378
Difference		**a,b >c**			**a,b >c**	

PIRS : Psychological Insulin Resistance Scale, DSCS: Diabetes Self-Care Scale,

That PIRS was higher in non-smokers compared to insulin users ($p<0.05$). No significant difference was found in the total mean DSCS score in insulin users based on smoking status ($p>0.05$). Diabetes self-care skills were higher in non-smokers compared to smokers in the non-insulin group ($p<0.01$).

Patients using insulin and those not using insulin, In the comparison made according to disease years, a significant difference was found in the total mean scores of PIRS and DSCS ($p<0.05$). It was determined that PIRS decreased as the disease years progressed in the patient group using insulin, while it increased as the disease years progressed in the patient group not using insulin. It was found that PIRS was significantly higher in the patient group not using insulin compared to the patient group using insulin for all disease years, and a significant difference was determined ($p<0.05$). It was determined that patients with a disease duration of 4-9 years, both

insulin users and non-users, had higher diabetes self-care skills than patients with a disease duration of 1-3 years (p>0.05). It was determined that patients with all disease durations in the patient group not using insulin had higher diabetes self-care skills than patients in the patient group using insulin (p<0.01).

It was found that the patients who received training had higher PIRS and DSCS scores in the patient groups using and not using insulin (p<0.05).

Patients using insulin, In the comparison based on BMI , a significant difference was found in the total mean PIRS and DSCS scores (p<0.05). Overweight patients using insulin had lower PIRS and DSCS scores (p<0.05). In the patient group not using insulin, no significant difference was found in terms of BMI (Table 3).

Table 4. Relationship Between the Psychological Insulin Resistance Scale (PIRS) and Diabetes Self-Care Scale (DSCS) in Type 2 Diabetic Patients Using and Not Using Insulin

Scales			DSCS
Insulin User	**PIRS**	r	-0.409 **
		p	**0,000**
		n	88
Non-Insulin User	**PIRS**	r	-0.333 **
		p	**0,000**
		n	112

** p<0.001

In the study, a negative moderately significant correlation was found between PIRS and DSCS (r:-481; p<0.001).

Discussion

Type 2 diabetes insulin use in patients' day increasingly is increasing. In this case in patients fear and self-care in their behavior changes from where it is happening. Research including diagnosed with type 2 diabetes patients using insulin patients The mean psychological insulin resistance score was found to be low and the mean psychological insulin resistance score of patients who did not use insulin was above the moderate level. The psychological insulin resistance status of all type 2 diabetes patients was found to be below the moderate level. These results indicate that insulin use is seen as undesirable, undesirable or difficult to accept situations for diabetes patients. In parallel with this finding in a study in the literature, Işık et al. (2021) found the mean score of diabetic patients (PIRS) to be below the moderate level in their study adapting the psychological insulin resistance scale to Turkish. Dağdelen

Güleyyupoğlu et al., (2022) found that patients diagnosed with diabetes had an above-average fear of finger pricking and injections. The study by Bayrak (2019) determined that 43.7% of diabetic individuals often or always experienced fear of self-injection. Alomran et al., (2020) found that 32.5% of type 2 diabetes patients admitted to primary health centers in Saudi Arabia were unwilling to use insulin. Polonsky et al. (2005) determined that a large majority (50.8%) of individuals with diabetes do not want to inject insulin because it is a painful procedure. A study conducted at a university hospital in Germany found that patients currently receiving insulin treatment had a more positive attitude toward insulin use than those not receiving insulin treatment (Bahrmann et al., 2018). It has been reported that individuals with newly diagnosed diabetes experience fear of injections and finger pricks, but over time, these fears become accustomed to and integrated into their lifestyles. Fasting blood glucose levels increase in parallel with the increase in their fear of testing (Çelik and Pınar, 2014). When these studies are evaluated in general, patients with type 2 diabetes report a common conclusion that insulin use and finger pricks are painful and frightening procedures that disrupt their daily routines.

Type 2 diabetic patients use insulin and those not using insulin patients. The self-care level was found to be below the acceptable level. Although the DSCS levels of patients using insulin were lower than those not using insulin, they were found to be below the acceptable level. This result led to the conclusion that insulin use negatively affects patients' diabetes self-care. Similar to the findings of this study, Çörekçi (2023) found the diabetes self-care level of patients not using insulin below the acceptable limit. Gerçek, (2017), Durak and Yılmaz (2022), Neşee et al., (2021) and Gökdeniz and Akgün Şahin, (2022) determined that the mean score of the diabetes self-care scale was below the acceptable level in their studies. The common results of all studies show that the diabetes self-care level is below the acceptable level. Different from these research findings, in the studies conducted by Yumuşak, Sezer and Dağdeviren, (2023) and İlhan et al., (2021), they found the mean score obtained from the diabetes self-care scale above the acceptable limit. These results suggest that this is due to the education level and cultural factors of the sample group constituting the study group.

This study found that nonsmokers had higher psychological insulin levels than non-smokers in both insulin-using and non-insulin-using patients. The mean diabetes self-care skills scores of nonsmokers in the insulin-using patient group were higher than those of smokers. No studies were found in the literature to support this finding. Smoking is thought to be a factor affecting the prognosis of the disease. Furthermore, a study by Türkcan Düzöz et al. (2009) determined

that smoking did not affect diabetes self-care skills. These research findings suggest that smoking has a negative impact on self-care.

While the chronic disease status of diabetic patients did not affect psychological insulin levels, patients without comorbidities in the insulin-using group were found to have higher diabetes self-care skills. Patients with or without comorbidities in the non-insulin-using group were found to have higher self-care skills than those in the insulin-using group with or without comorbidities.

In this study, patients using insulin and those not using insulin, It is observed that the number of years of disease and the status of education about diabetes affect psychological insulin resistance and self-care status. In the study by Alomran et al., (2020), it was found that 34.7% of patients with a disease duration of 6-10 years and 28.0% of those with a disease duration of 11-15 years experienced reluctance to use insulin. In a study conducted in Malaysia, a highly positive correlation was found between longer diabetes duration and insulin refusal. The same study found that the likelihood of insulin refusal more than doubled in patients diagnosed with diabetes less than 10 years ago (Ishak et al., 2019). A study conducted in Korea determined that insulin refusal was higher among those with shorter disease duration (Song et al., 2019). However, in the studies conducted by Almaghaslah et al. (2018) in Saudi Arabia and Sabei and Sammud (2015) in Libya, no significant relationship was found between insulin refusal/reluctance and the duration of diabetes. Those with a history of disease of 0-5 years had higher self-care ability scores, but this finding was not statistically significant. All these studies suggest that increasing the time elapsed since diagnosis in patients with type 2 diabetes has a positive effect on the self care.

This study determined that overweight patients who used insulin had lower psychological insulin resistance and self-care levels. Çevik Aktura and Özden (2022) determined that PID increased as BMI increased in patients with type 2 diabetes. The findings between BMI and PID in this study differed from those in the literature. This is thought to be due to differences in eating habits. Alomran et al. (2020) found that low BMI impacted diabetes self-care skills. This suggests that BMI has an impact on diabetes self-care skills.

The study found that as patients' psychological insulin levels increased, their self-care skills decreased. Lim and Song (2020) found a significant and negative relationship between diabetes self-efficacy and psychological insulin resistance. Education and practices aimed at reducing psychological insulin resistance led to better self-care behaviors in elderly patients with type 2 diabetes, which in turn led to reduced HbA1c levels (Kuo et al., 2017). Factors such as age,

gender, education level, economic status, eating habits, and living alone demonstrated an interaction between PIRS.

Limitations of the Study

The study comprised 200 patients over the age of 18 diagnosed with type 2 diabetes who presented it to Selahaddin Eyyubi State Hospital. The data obtained in this study are limited by the scales used and the study group.

Conclusion and Suggestions

The mean PIRS scores of the type 2 diabetic patients included in the study were found to be below the moderate level, and their self-care was found to be below an acceptable level based on the mean DSCS scores. A significant difference was found between the total mean psychological insulin resistance scores and the patients' smoking status, disease duration, and diabetes-related education. It was determined that the duration of the patients' disease and diabetes-related education affected their self-care status. A negative, moderately significant correlation was found between the patients' mean psychological insulin resistance scores and their mean diabetes self-care scores.

In line with these results, recommendations are as follows;

- Nurses should identify patients' fears and concerns about insulin resistance and provide the necessary training,

- Regular training to increase the self-care skills of diabetic patients,

-It is thought that more extensive studies are needed to determine the variables that may cause psychological insulin resistance in diabetes.

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