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Research Article

THE EFFECT OF DIFFICULTIES EXPERIENCED BY INDIVIDUALS WITH DIABETES ON THEIR PERCEPTION OF VULNERABILITY TO DISEASES

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ABSTRACT

This study aimed to explore the impact of psychosocial and personal challenges experienced by Type 2 diabetes patients on their perceived vulnerability to illness. It focused on understanding how difficulties in diabetes management influence this perception. The study included 156 Type 2 diabetic patients treated in a university hospital in eastern Türkiye. Data were collected using the Participant Introduction Form, Strengths and Difficulties in Diabetes Scale, and Perception of Vulnerability to Diseases Scale. Statistical analyses included independent t-tests, ANOVA, and structural equation modeling. Participants had an average age of 56.00±14.68 years, with a mean HbA1C level of 10.75±2.10. 69% did not exercise regularly, and 74.2% did not fully adhere to their diets. A positive correlation was found between high HbA1C levels and psychosocial and individual difficulties. Individual challenges positively affected vulnerability perception, while psychosocial challenges showed a negative relationship. Diabetes management requires not only medical treatment but also education, psychosocial support, and individualized care. These holistic approaches can reduce vulnerability perceptions and enhance health outcomes, highlighting the need for education and psychosocial support programs.

INTRODUCTION

Diabetes is one of the most common chronic diseases in the world and has a significant impact on patients' quality of life. The treatment of diabetes is a complex process that involves not only physical health but also psychological and social aspects. These challenging processes that patients experience can increase their anxiety about their health, and this perception can affect their ability to manage diabetes (Martinez et al., 2016).

Patients with diabetes face situations requiring constant self-care, such as controlling blood glucose levels, taking medication regularly, regulating eating habits, and increasing physical activity (American Diabetes Association [ADA], 2022). The difficulties experienced in this process make it difficult for patients to adapt to the disease and may negatively affect their treatment adherence. Among these difficulties, emotional problems such as depression, anxiety, and anger are common. These conditions can negatively affect patients' self-care skills and glycemic control (Kalra, Jena & Yeravdekar, 2018; McCoy & Theeke, 2019). In addition

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to psychosocial factors, it is frequently emphasized in the literature that patients with diabetes have difficulty in disease management and treatment compliance due to a lack of information (Kalra et al.., 2018). In addition, family support significantly impacts patients' success in disease management. Lack of family support may cause patients to feel isolated and lonely, which may weaken their coping strategies (Fisher, Hessler, Polonsky & Mullan, 2012). Therefore, not only medical treatment but also psychosocial support and continuous education are important in the management of diabetes (Berry, Lockhart, Davies, Lindsay & Dempster, 2015).

The perceived vulnerability of individuals with diabetes to the disease is another important factor to be considered. It is a major concern for individuals living with diabetes, as it can profoundly affect their mental health, stress levels, self-management behaviors, and overall quality of life. This perception is often shaped by a variety of psychological and social factors, including the chronic nature of diabetes, its associated complications, and the individual's coping mechanisms (Fisher, Polonsky, Asuni, Jolly & Hessler, 2020; García-Lara et al., 2022). Chronic stress associated with diabetes management has also been shown to lead to increased psychological distress and affect both mental and physical health outcomes, especially during challenging times such as the COVID-19 pandemic (Al-Rahimi, Nass, Hassoubah, Wazqar & Alamoudi, 2021). Supporting individuals with chronic diseases not only physically but also psychologically during such periods is of great importance to alleviate the feeling of vulnerability to infectious diseases (Fos, Honore' & Kellum, 2022). The fear of contracting the disease has also been an important factor leading to the disruption of diabetes management processes. Individuals hesitate to apply to health services due to the fear of exposure to infectious diseases, which leads to serious disruptions in diabetes management and more frequent complications (Abdou, Hassan, Hassanein, Elsebaie & Shamma, 2022).

Individuals with diabetes have difficulty controlling their disease and creating a healthy lifestyle. Undoubtedly, these individuals need holistic approaches incorporating behavioral immune systems, in other words, perceptions of vulnerability and psychological coping mechanisms. In this regard, nurses and other health professionals need to work in team cooperation in order for patients to overcome these challenges. This study aims to examine the effect of the difficulties experienced by individuals with diabetes on the perception of vulnerability to diseases.

MATERIAL AND METHOD

Research Design and Population

This study was planned with a descriptive and correlational design and was conducted in the endocrine clinic of a university hospital in eastern Türkiye. The study population covered patients diagnosed with Type 2 diabetes mellitus who were followed up in the endocrine clinic. The sample size was determined according to the power analysis as 153 patients based on a 95% confidence interval, 0.95 effect size, and 5% bias level, with a 95% population representation. Using random sampling, 156 patients were reached during the data collection process.

Data Collection Tools

Data were collected through face-to-face interviews at the convenience of the patients. Each interview lasted approximately 15-20 minutes.

Participant Introduction Form:

This form was developed by the researchers to determine the sociodemographic characteristics of the patients (age, education, employment, economic status, etc.) and their diabetes-related characteristics (disease duration, treatment type, exercise, etc.). It consists of 21 questions (Fisher, Glasgow & Strycker, 2010; Powers et al. .., 2017)

Strengths and Difficulties in Diabetes Scale (SDDS)

It was developed by Bilgehan and Inkaya in 2023. The 30-item scale includes 3 subscales: "Psychosocial difficulties" (13 items: 1-13), "Individual difficulties" (9 items: 14-22) and "Lack of knowledge" (8 items: 23-30). The scale items are scored on a 5-point Likert scale from 5 = I always have difficulties to 1 = I never have difficulties. A minimum of 30 and a maximum of 150 points can be obtained, with higher scores indicating higher difficulty levels. In the original form of the scale, Cronbach's alpha value was calculated as 0.852 (Bilgehan & İnkaya, 2023). In our study, the Cronbach alpha value of the scale was 0.896.

Perception of Vulnerability to Diseases Scale (PDSI-S)

The scale was developed by Duncan et al. in 2009 (Duncan, Schaller & Park, 2009). Its validity and reliability in Turkish was established by Ünal et al. in 2023 (Ünal, Özlem & Gökler, 2023). HKSA-S includes 15 items in 2 subscales: Sensitivity to Infectious Diseases (2,5,6,8,10,12,14) and Avoidance of Microorganisms (1,3,4,7,9,11,13,15). Items 3,5,11,12,13,14 are reverse-scored. Scores between 7-105 can be obtained from the scale.

Scoring is done on a 7-point Likert scale with 1=strongly disagree-7=strongly agree, with higher scores indicating a higher perception of vulnerability. In the reliability analysis of the Turkish version of the scale, the internal consistency Cronbach's alpha coefficient was found to be 0.712. In our study, the Cronbach alpha value of the scale was 0.774.

Inclusion Criteria

Being 18 years of age or older,

To have been diagnosed with Type 2 DM for at least 1 year,

Being on oral antidiabetic and/or insulin therapy,

Being conscious.

Exclusion Criteria

Having a disability in understanding and communicating in Turkish,

Having a hearing loss,

Receiving diet-only and/or exercise-only treatment,

Being diagnosed with a psychiatric disorder.

Data Analysis

R Studio software was used for descriptive data (frequency, mean, standard deviation, median, minimum, and maximum values), reliability analysis, and multicollinearity analysis. In the second stage, a path analysis was conducted with the observed variables using Structural Equation Modeling (SEM) to determine whether there was an effect between the FGDS subscales, the HKSA-I, and participants' glycemic control (HbA1C). The statistical significance level was set at $p< 0.05$.

Ethical Approval

Necessary permissions were obtained from the relevant institution and ethics committee for the study. The purpose of the study was explained to the participants, and their written informed consent was obtained. Ethical approval (2024/5549) was obtained from İnönü University Health Sciences Non-Interventional Clinical Research Ethics Committee, and the necessary permissions (dated 27/11/2023-376886) were obtained from the university hospital of the university where the study was conducted. The questionnaire, which was filled out by face-to-face interview, included information about the purpose and content of the study. The subjects were told that participation was voluntary. The participants’ consent was obtained. The identity information of the participants was not recorded in the questionnaire. This study was conducted in accordance with the Declaration of Helsinki Principles.

RESULTS

The patients' mean age was 56.00±14.68 years, mean BMI was 29.17±6.42, 56.1% were male, 87.1% were married, 18.1% were illiterate, 42.6% had primary education, 25.2% had high school education, and 14.2% had undergraduate or higher education. The income of 85.2% of the patients was equal to or less than their expenses. The mean duration of diabetes was 12.04±7.77 years, and the mean HbA1C level was 10.75±2.10. 74.2% of the patients had a family history of diabetes, 96.1% were receiving diabetes treatment, and 85.2% were taking their treatment regularly. 69% did not exercise regularly. 74.2% partially or never followed their diet, 50.3% measured their blood glucose 1-2 times a week, and 62.6% attended regular check-ups. 88.4% of the patients received education about diabetes, and 62.6% had comorbid chronic diseases.

Table 1. Participants' Sociodemographic and Clinical Characteristics

Sociodemographic Characteristics	**X̄±SD**	
Age	56.00±14.68	
BMI	29.17±6.42	
Duration of diabetes	12.04±7.77	
HbA1C	10.75±2.10	
	n	**%**
Gender		
Female	68	43.9%
Male	87	56.1%
Marital Status		
Married	135	87.1%
Single	20	12.9%
Education		
Illiterate	28	18.1%
Primary education	66	42.6%
High School	39	25.2%
Undergraduate and higher	22	14.2%
Income Level		
Income less than expenditure	40	25.8%
Income equal to expenditure	92	59.4%
Income more than expenditure	23	14.8%
Is There Another Diabetes Patient in the Family?		
Yes	115	74.2%
No.	40	25.8%
Treatment received for diabetes		
Oral antidiabetics	63	40.6%
Insulin	35	22.6%
Oral antidiabetics+insulin	51	32.9%
Not receiving treatment	6	3.9%
Do you take the medications regularly?		
Yes	132	85.2%
No.	8	5.2%
Only when needed	15	9.7%
Do you exercise regularly?		
Yes	48	31%
No.	107	69%

Do you follow the diet?		
Yes	40	25.8%
No.	30	19.4%
Partially	85	54.8%
Frequency of measuring blood glucose		
1 time a day	38	24.5%
2 times a day	39	25.2%
1-2 times a week	78	50.3%
Do you go for regular check-ups?		
Yes	58	37.4%
No.	97	62.6%
Have you received education on diabetes?		
Yes	137	88.4%
No.	18	11.6%
Any comorbidities?		
Yes	97	62.6%
No.	58	37.4%

The participants' mean scores were 52.63±9.68 for Psychosocial Difficulties, 26.83±8 for Individual Difficulties, and 34.69±4.39 for Lack of Knowledge. Their mean Sensitivity to Infectious Diseases score was 27.20±8.80, and their mean Avoidance of Microorganisms score was 34.87±12.77. The mean total score of the Strengths and Difficulties in Diabetes scale was 114.16±16.20, and the mean total score of the Perception of Vulnerability to Diseases scale was 62.07±20.33.

Table 2. Means scores from the Scales and Subscales

	Min.	**Max.**	**Mean±SD**
Psychosocial Challenges	22	65	52.63±9.68
Individual Challenges	9	45	26.83±8
Lack of Information	22	40	34.69±4.39
Vulnerability to Infectious Diseases	10	44	27.20±8.80
Avoiding Microorganisms	9	56	34.87±12.77
Strengths and Challenges in Diabetes	53	150	114.16±16.20
Perception of Vulnerability to Diseases	19	100	62.07±20.33

The fit values were CMIN = 3.619, DF = 3, CMIN/DF = 1.206, RMSEA = 0.025, CFI = 0.908, and GFI = 0.912, indicating that the model shows a good fit with the data. In particular, the CMIN/DF value below 3, the RMSEA value below 0.05, and the CFI and GFI values above 0.90 indicate that the model has an acceptable fit. The HbA1C variable had significant and positive effects on individual difficulties ($\beta = 1.249$, $p < .001$), psychosocial difficulties ($\beta = 1.556$, $p < .001$), lack of knowledge ($\beta = 0.331$, $p = .018$) and perception of vulnerability ($\beta = 1.320$, $p = .015$). These findings suggest that with the deterioration of metabolic control, individuals experience more difficulties in various areas and feel more vulnerable.

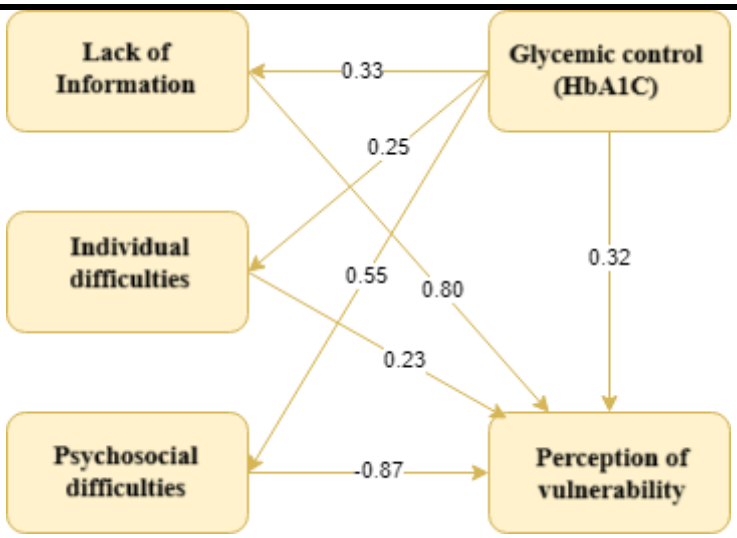

Figure1 . Non-Standardized Path Coefficients

Lack of knowledge has a positive and significant effect on the perception of vulnerability (β = 0.804, p = .003). This result indicates that individuals feel more vulnerable as their knowledge level decreases. A negative and significant relationship was found between psychosocial difficulties and perception of vulnerability (β = -0.871, p < .001). This unexpected finding indicates that the perception of vulnerability decreases as psychosocial difficulties increase. This suggests that individuals may have developed psychological resilience in the face of psychosocial challenges. A strong, positive, and significant relationship exists between personal difficulties and perception of vulnerability (β = 1.228, p < .001). This result reveals that individuals feel more vulnerable as the difficulties they experience on a personal level increase (Figure 1, Table 3).

Table 3. Structural Equation Model with Path Analysis

	ß0	ß1	SH	Test	p
Individual Difficulties <--- DD	0.386	0.249	0.241	2.189	***
Psychosocial Difficulties <--- DD	0.399	0.556	0.088	5.392	***
Lack of Knowledge <--- GK	0.188	0.331	0.139	3.373	.018
Perception of Vulnerability <--- DD	0.169	0.320	0.044	3.027	.015
Perception of Vulnerability <--- Lack of Knowledge	0.181	0.804	0.266	6.122	.003
Perception of Vulnerability <--- Psychosocial Difficulties	-0.436	-0.871	0.128	-7.588	***
Perception of Vulnerability <--- Individual Difficulties	0.410	0.228	0.154	1.884	***

β0: standardized coefficient; β1: non-standardized coefficient; GC: Glycemic Control

DISCUSSION

The findings of this study, which aimed to examine the important associations between metabolic control, psychosocial difficulties, knowledge levels, and perceptions of vulnerability

among individuals with diabetes, are discussed in the light of the literature. In particular, higher HbA1c levels, indicative of poorer glycemic control, are significantly associated with increased individual difficulties, psychosocial difficulties, lack of knowledge, and increased perceptions of vulnerability. These results underscore the complex interplay between physiological health and psychosocial factors in diabetes management.

The mean psychosocial difficulty scores of participants with diabetes point to the significant challenges faced by this population. The mean score of 52.63±9.68 reported for psychosocial difficulties is consistent with findings highlighting the prevalence of emotional and behavioral problems among children and adolescents with diabetes, particularly those with type 1 diabetes (Bernstein, Stockwell, Gallagher, Rosenthal & Soren, 2013; S Ahmed, M. M. Monazea, E Abdel- El Naser & A M Kotb, 2016). Individual challenges, with an average score of 26.83±8, reflect the unique struggles faced by these individuals and are supported by studies highlighting mental health issues such as anxiety and depression that are common in young people with diabetes (Bernstein et al, 2013; Hilliard et al., 2017). Furthermore, the mean score of 34.69±4.39 for lack of knowledge indicates a knowledge gap that may exacerbate psychosocial challenges, as poor understanding of diabetes management has been linked to poorer health outcomes (Schwartz, Cline, Axelrad & Anderson, 2011; Zenlea et al., 2014). Sensitivity to infectious diseases and avoidance of microorganisms scores also underscore the health concerns prevalent in this population (S Ahmed et al, ., 2014). Overall, total scores from the Strengths and Challenges in Diabetes scale and the Perception of Vulnerability to Illness scale highlight multifaceted psychosocial burdens that require targeted interventions to improve the quality of life of these individuals (Schwartz et al., 2011; Westrupp, Northam, Lee, Scratch & Cameron, 2015).

The relationship between worsening metabolic control and individuals' perception of vulnerability is well documented in the literature. As metabolic control worsens, individuals often report increased feelings of vulnerability and psychological distress, as evidenced by elevated HbA1c levels. Research shows that poor glycemic control is associated with increased psychological burden, including anxiety and depression, which may exacerbate perceptions of vulnerability (Hirai et al., 2021; Muszalik, Stępień, Puto, Cybulski & Kurpas, 2022).

The positive correlation between high HbA1c and increased individual and psychosocial difficulties is consistent with the existing literature. Poor glycemic control has been associated with high psychological distress, poor quality of life, and increased burden of diabetes management (Delamater et al., 2001; Fisher et al.., 2012). High blood glucose levels can lead

to physical symptoms that disrupt daily activities and contribute to emotional tension, thus exacerbating individual difficulties and psychosocial stressors.

The association between lack of knowledge and increased perception of vulnerability highlights the critical role of patient education in diabetes care. Individuals with limited knowledge about their condition may feel insecure and anxious about managing their health, leading to a greater sense of vulnerability. The finding that lack of knowledge significantly influenced the perception of vulnerability ($\beta = 0.804$, $p = .003$) suggests that individuals with low health literacy may be more exposed to risks associated with their illness. This is consistent with research showing that inadequate knowledge about health conditions can lead to increased feelings of vulnerability and anxiety (Endres et al., 2021; Rizeq et al., 2023; Stock, Zucchelli, Hudson, Kiff & Hammond, 2020). Indeed, effective diabetes self-management education has been shown to improve knowledge, empower patients, and increase self-efficacy, which can alleviate feelings of vulnerability and improve health outcomes (Chrvala, Sherr & Lipman, 2016; Powers et al., 2015).

Of particular interest is the negative and significant ($\beta = -0.871$, $p < .001$) relationship between psychosocial challenges and perceptions of vulnerability. This suggests that as individuals face more psychosocial adversity, they may develop a type of resilience that mitigates their perceptions of vulnerability. Resilience enables individuals to adapt positively in the face of adversity, potentially reducing their perceived vulnerability despite ongoing challenges (Survonen, Suhonen & Joronen, 2024; Windle, 2011). This phenomenon has been shown in several studies that individuals faced with chronic stressors exhibit adaptive coping mechanisms that can change their perceptions of risk and vulnerability (Almuqrin et al., 2023; Ghanem, Evangeli-Dawson & Georgiades, 2023; Shrira, Palgi, Ben-Ezra & Shmotkin, 2011). Resilience may manifest in the form of effective coping strategies, use of social support, or reassessment of stressors and may mitigate the impact of psychosocial challenges on perceptions of vulnerability.

The strong positive association between personal challenges and perceptions of vulnerability ($\beta = 1.228$, $p < .001$) reinforces the idea that personal struggles directly influence how vulnerable individuals feel. As individuals face more individual challenges, such as managing symptoms, adhering to treatment regimens, or coping with lifestyle changes, they may become more susceptible to negative outcomes. This is in line with the biopsychosocial model, which suggests that personal, social, and biological factors interact to shape an individual's health outcomes and psychological state (Almuqrin et al., 2023; Rizeq et al., 2023; Russell & Russell, 2019). This finding highlights the importance of addressing personal

challenges through individualized care plans, psychosocial support, and interventions that enhance coping skills (Herzer & Hood, 2010).

These results illuminate the complex links between metabolic control and psychosocial factors in diabetes management. Interventions aimed at improving glycemic control, increasing patient knowledge through education, promoting resilience, and addressing personal challenges are vital. Such comprehensive approaches can alleviate feelings of vulnerability, reduce psychosocial and individual challenges, and ultimately improve health outcomes for individuals with diabetes.

Limitations of the Study

The most important limitation of this study is that it was conducted with patients hospitalized in the endocrine service of a university hospital in the Eastern Anatolia Region of Türkiye. Therefore, it should not be generalized to all diabetes patients. Further research should be conducted on nurses in other hospitals, such as private endocrine services.

CONCLUSION

This study underlines the important relationship between metabolic control and psychosocial factors in diabetes management. Higher HbA1c levels, indicative of poorer glycemic control, are positively associated with increased individual and psychosocial challenges as well as a higher sense of vulnerability. Effective patient education by nurses can help reduce these vulnerabilities by increasing knowledge and self-efficacy. Furthermore, increasing resilience through nursing interventions may contribute to individuals better coping with ongoing psychosocial challenges. Therefore, comprehensive diabetes care should integrate nursing-based strategies and approaches to improve glycemic control, provide educational support, and address personal and psychosocial needs. This will contribute to the field of Internal Medicine Nursing to better understand the psychosocial needs of patients with diabetes and to tailor nursing interventions accordingly. In particular, developing and implementing structured nursing education programs is recommended to reduce individuals' feelings of vulnerability. In addition, offering training that strengthens nurses' psychosocial assessment skills and encouraging individualized care approaches may improve both patient outcomes and the effectiveness of nursing services.

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