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Evaluation of Diabetic Stress and Depression in Patients with Geriatric Type 2 Diabetes

Geriatrik Diyabetli Hastalarda Diyabetik Stres ve Depresyonun Değerlendirilmesi

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ABSTRACT

Objective: This study was conducted to determine the levels of diabetes-related stress and depression in geriatric diabetic patients and to determine the relationship between them.

Methods: This descriptive, cross-sectional and correlational study was conducted between November 2020 and March 2021 with 200 individuals with type 2 diabetes who came to the endocrine and internal medicine outpatient clinic of a state hospital in Kars. Data were collected through face-to-face interviews using the Patient Information Form, Diabetic Distress Scale and Geriatric Depression Scale. Descriptive statistics, Mann-Whitney U Test and Spearman's correlation analysis were used to evaluate the data.

Results: 69% of the patients were between 65-70 years of age. The mean HbA1c value was 8.40±1.63 and the mean duration of diabetes diagnosis was 7.46±7.30 years. The mean value of Diabetes Distress Scale was 5.51±1.09 and the mean value of Geriatric Depression Scale was 16.10±6.34. There was a significant positive correlation between Geriatric Depression Scale and Diabetes Stress Scale ($p < .05$).

Conclusion: It was found that the patients had high levels of diabetes-related stress and moderate levels of depression. As geriatric depression increased, the stress experienced by the patients increased.

Keywords: Depression, distress, elderly, type 2 diabetes

ÖZ

Amaç: Bu çalışma geriatrik diyabetili hastalarda diyabete bağlı stres ve depresyon düzeylerini belirleyerek aralarındaki ilişkiyi tespit etmek amacıyla yapılmıştır.

Yöntem: Tanımlayıcı, kesitsel ve ilişki arayıcı türdeki bu çalışma, Kasım 2020 ile Mart 2021 tarihleri arasında Kars'ta bir devlet hastanesinin endokrin ve iç hastalıkları polikliniğine gelen 200 tip 2 diyabetli birey ile yürütülmüştür. Veriler Hasta Bilgi Formu, Diyabetik Distres Ölçeği ve Geriatrik Depresyon Ölçeği kullanılarak yüz yüze görüşme yoluyla toplanmıştır. Verilerin değerlendirilmesinde tanımlayıcı istatistikler, Mann-Whitney U Testi ve Spearman korelasyon analizi kullanılmıştır.

Bulgular: Hastaların %69'u 65-70 yaş arasındaydı. Ortalama HbA1c değeri 8,40±1,63 ve ortalama diyabet tanı süresi 7,46±7,30 yıldı. Diyabet Stres Ölçeği ortalama değeri 5,51±1,09 ve Geriatrik Depresyon Ölçeği ortalama değeri 16,10±6,34 idi. Geriatrik Depresyon Ölçeği ile Diyabet Stres Ölçeği arasında pozitif yönde anlamlı bir korelasyon vardı ($p < .05$).

Sonuç: Hastaların diyabetle ilişkili stres düzeylerinin yüksek ve depresyon düzeylerinin orta seviyede olduğu tespit edilmiştir. Geriatrik depresyon arttıkça hastaların yaşadığı stres de artmıştır.

Anahtar Kelimeler: Depresyon, distres, tip 2 diyabet, yaşlılık

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Introduction

This study was conducted as a descriptive, cross-sectional and correlational study. Aging is the process of irreversible differences that occur in the human body over time. As the differences occur, the prevalence of chronic diseases also increases in the elderly. Therefore, the elderly need more medical treatment and care (Rintala, 2013). With the increase in the elderly population worldwide, the incidence of chronic diseases is also increasing (Sithu et al., 2017). Furthermore, diabetes is significantly present as a chronic disease incidence worldwide. Diabetes can lead to loss of competence; development of dependency on others; changes in body appearance; causes anxiety, fear, and distress for the future; and negatively affects the physical and emotional well-being and social life of patients (Türten Kaymaz & Akdemir, 2016). Negative emotions (e.g., worry, depression, and stress) in patients can aggravate diabetes and its symptoms and increase emotional problems (Ell et al., 2015). Moreover, the physical damage caused by diabetes and its complications and the progression of the disease affects the psychological well-being more negatively, especially in the elderly. These feelings cause the progression of diabetes complications (Kasteleyn et al., 2015; Hessler et al., 2015). Since the elderly often have cognitive deficiencies, limitations in their daily activities, undiagnosed depression, and difficulties in social issues, paying attention to these issues in the elderly is necessary (Knech et al., 2011; Rasmussen et al., 2011). Furthermore, diabetes increases the tendency for depression, and depressive symptoms make it difficult to adapt to diabetes (Mazanec et al., 2011). Failure to indicate somatic symptoms (decrease or increase in appetite, insomnia, fatigue, psychomotor slowing, and so on) from the symptoms of diabetes or the side of medications make it difficult to diagnose depression as part of the process in which the disease occurs (Kocaman et al., 2007). Thus, the diabetic person should be evaluated in terms of depression if he does not participate in the treatment even though he is physically sufficient, if his complaints persist despite his medical condition with the appropriate treatment, if he does not feel well, shows less functionality than his abilities, and if he experiences a loss of interest and pleasure (Thanakwang et al., 2014; Vu et al., 2018). The risk of developing premorbid distress and depression is twice as high in diabetic patients compared with the general population (Polonsky, 2005). Consequently, distress and depression negatively affect the clinical condition and quality of life in diabetic patients (Çaklılı et al., 2020). It also causes a decrease in the patient's compliance with diabetes self-care recommendations and problems in terms of social relations (Kocaman et al., 2007). However, distress and depression are often not recognized and therefore patients cannot be properly treated in this respect (Thanakwang et al., 2014; Vu et al., 2018; Polonsky et al., 2005). When the literature is examined, the number of studies determining the levels of stress and depression due to diabetes using measurement tools specific to the elderly is limited (Çaklılı et al., 2020; Ell et al., 2015; Rintala, 2013). Thus, this study was conducted to determine the levels of distress and depression due to diabetes in elderly diabetic patients. This study sought answers to the following questions:

1) What is the level of diabetes stress in elderly people with type 2 diabetes?
2) What is the level of depression in elderly people with type 2 diabetes?
3) Is there a relationship between diabetes-related stress and depression in elderly people with type 2 diabetes?

Methods

This study was conducted as a descriptive, cross-sectional and correlational study and the ethical approval was obtained from the "Kafkas University Faculty of Health Sciences Ethics Committee" (Date: 06.10.2020, Decision no: 2020/8). All individuals included in the study were informed and signed voluntary consent forms. The population of the study consisted of patients who applied to the internal medicine and diabetes polyclinic of Kars Harakani State Hospital. The study sample consisted of 200 patients who met the inclusion criteria between November 2020 and March 2021. The inclusion criteria were the following: 65 years and older, diagnosed with type 2 diabetes for at least 1 year, taking oral antidiabetic and/or insulin therapy, having a diet program, not having diagnosed psychiatric disorder, having person, place and time orientation, and oral and written to participate in the study formed patients who gave consent. Sampling calculation was determined in G*Power 3 statistical analysis program with 95% confidence interval and 0.90 power ratio (minimum 120 persons).

Data Collection

The data were collected through patient introductory information forms prepared by the researcher Diabetes Distress Scale (DDS) and The Geriatric Depression Scale (GDS).

Patient introductory information forms

In the form created by the authors, there were questions that identify the patient's demographics and diabetes characteristics (Kocaman et al., 2007; Thanakwang et al., 2014; Vu et al., 2018; Polonsky et al., 2005).

Diabetes distress scale (DDS)

DDS was developed by Polonsky et al. (2005) to assess the psychosocial distress in diabetic patients (Polonsky et al., 2005) Çaklılı et al. (2020) conducted its Turkish validity and reliability study (Çaklılı et al., 2020). The scale consists of 17 items. Each item is evaluated between 1 and 6 points. A score of 1 means no stress, a score of 6 means serious stress. A score of ≥3 is defined as type 2 diabetes-related stress. The scale, which has 4 subscales: Emotional Burden, Doctor Stress, Regime Stress and Interpersonal Stress, evaluates the stress experienced in the last month. The original version of the DDS has been shown to be reliable alpha (α) = 0.9. In this study, alpha coefficient was 0.86.

The geriatric depression scale (GDS)

This scale was developed by Yesavage et al. (1983) and contains 30 items, each of which is rated yes or no (Yesavage et al., 1983). Items are scored as either 0 or 1 points and the total score is rated on a scoring grid. Participants with scores of 0-9 are classified as normal, those with scores of 10-19 as mildly depressed, and those with scores of 20-30 as severely depressed. Ertan and Eker (2000) conducted its Turkish validity and reliability study. In this study, alpha was 0.84 (Ertan & Eker, 2000).

Statistical Analyses

The data were analyzed using the Statistical Package for the Social Sciences IBM SPSS Corp., Armonk, NY, USA package program in a computer environment. The compliance of the data to normal distribution was examined using the Shapiro Wilk test. Kruskal Wallis and Mann Whitney U tests were used to compare data that did not conform to normal distribution. Spearman correlation analysis was used to examine the relationship between the sub-dimensions of the scales. Reliability analysis studies were done with Cronbach Alpha. $p < .05$ was considered significant.

Results

It was determined that 69.0 % of the patients were aged between 65-74 years, 54.5% were female, illiterate 46.5%, 84.0% were married. In 67.0% the income=expenditure, 83.5% were unemployed, 47.0% were living in a village, 58.5% were living with spouse, 77.5% were diagnosis duration of 11 years and above, 87.5% were regularly blood glucose, 82.5% had presence of having another disease, 82% had cardiovascular complications of diabetes, 55.0% HbA1c level; %5-10. Elderly diagnosis duration was 7.46±7.30 years and HbA1c level were 8.40±1.63 (Table 1). Regimen related distress subscale mean score; It was found to be higher and statistically significant in the elderly who were single, unemployed, living in the village, diagnosed with diabetes for more than 11 years ($p < .05$). Physician-related distress subscale mean score; high in illiterated and unemployed elderly and statistically significant ($p < .05$). Diabetes-related interpersonal distress subscale mean score; It was found to be higher and statistically significant in the elderly who are in the 75-84 age group, who are illiterate and live alone ($p < .05$). (Table 2). DDS and GDS mean scores; high school and above, diabetes-related complications and HbA1c levels more than 11% were found to be higher in the elderly who did not work, who had been diagnosed with diabetes for more than 11 years, who did not regularly measure flank glucose levels, and were statistically significant ($p < .05$). (Table 3). When the distribution of the scale mean scores was examined, the mean score of DDS subscales; emotional burden was determined to (1.31±0.35) moderate level. Regimen distress was determined to (1.62±0.42), Physician distress was determined to (1.45±0.44) and interpersonal distress was determined to (1.11±0.33) high distress. The mean score of total DDS was (5.51±1.09) high distress and the obtained mean score mean score of GDS 16.10±6.34 was high depression. It was determined that as the total mean score of DDS, emotional burden distress and regimen related distress levels increased, depression level increased. A statistically significant and a weak positive correlation was found between these scales ($p < 001$) (Table 5).

Table 1. Socio-demographic characteristics of elderly (n=200)

Variables	Number	%
Age		
65-74	138	69.0
75-84	48	24.0
85 and over	14	7.0
Gender		
Female	109	54.5
Male	91	45.5
Educational Status		
Illiterate	93	46.5
Literate	49	24.5
Primary school	42	21.0
High school and above	16	8.0
Marital Status		
Married	168	84.0
Single	32	16.0

Table 1. Socio-demographic characteristics of elderly (n=200) (Continue)

Variables	Number	%
Perceived level of income		
Income > expenditure	16	8.0
Income = expenditure	134	67.0
Income < expenditure	50	25.0
Work Status		
Working	33	16.5
Unemployed	197	83.5
Patient's residence		
Province	40	20.0
District	66	33.0
Village	94	47.0
Living arrangement		
Alone	19	9.5
Living with a spouse	117	58.5
Living with children/relatives	56	28.0
Other	8	4.0
Diagnosis duration		
1-5 years	15	7.5
6-10 years	30	15.0
>11 years	155	77.5
Regularly blood glucose checking status		
Yes	175	87.5
No	25	12.5
Presence of having another disease		
Yes	165	82.5
No	35	17.5
***Diabetes-related complications**		
Serebro-vascular diseases	152	76.0
Cardiovascular diseases	164	82.0
Peripheral diseases	112	56.0
Diagnosis duration		
1-5 years	15	7.5
6-10 years	45	22.5
>11 years	130	70.0
Total HbA1c level		
<5	20	10.0
5-10	110	55.0
>10	70	35.0

Diabetes characteristics of elderly	Min	Max	Mean	SD
Diagnosis duration (year)	2	50	7.46	7.30
HbA1c	5	15.60	8.40	1.63

Table 2. Socio-demographic characteristics by DDS and GDS scores

Diabetes Distress Scale	Emotional burden Distress mean±SD	Regimen related Distress mean±SD	Physician-related Distress mean±SD	Diabetes-related interpersonal Distress mean±SD	DDS Mean±SD	GDS Mean±SD
Age						
65-74	13.45±3.64	16.26±4.28	14.66±4.48	10.38±3.24	55.77±11.60	15.55±6.05
75-84	12.66±2.91	15.75±4.13	14.37±4.13	12.16±3.49	52.95±7.21	17.08±7.32
85 and over	12.42±3.20	17.28±4.45	14.42±5.43	10.85±3.89	56.00±14.82	18.14±4.84
Test and p	KW:2.067, *p > .05*	KW: 3.251, *p > .05*	KW: 0.706, *p > .05*	KW:9.244, *p < .05*	KW: 3.975, *p > .05*	KW: 3.877, *p > .05*
Gender						
Female	13.01±3.66	15.81±4.17	14.53±4.37	11.09±3.55	57.45±11.70	17.46±6.34
Male	13.40±3.43	16.69±4.34	14.63±4.56	11.16±3.18	54.90±10.08	14.46±5.97
Test and p	t:0.767, *p > .05*	t:0.451, *p > .05*	t:0.166, *p > .05*	t:0.152, *p > .05*	t:0.924, *p > .05*	t:3.428, *p < .001*
Educational Status						
Illiterate	13.08±3.71	16.34±4.67	15.00±4.65	12.06±3.51	54.49 ±11.83	17.52±6.54
Literate	13.06±2.60	16.10±3.84	13.73±.76	10.57±2.76	54.46±7.93	15.02±5.81
Primary school	14.28±3.54	16.09±3.49	13.19±3.93	11.42±3.59	54.00±9.61	14.85±5.95
High school and above	11.37±4.52	16.12±5.12	11.87±6.11	10.37±3.64	57.75±16.63	14.37±6.46
Test and p	KW:6.952, ***p < .05***	KW:0.846, *p > .05*	KW:4.100, *p < .05*	KW:5.628, *p < .05*	KW:2.310, *p < .05*	KW:11.659, *p < .001*
Marital Status						
Married	13.14±3.36	15.43±4.14	14.69±4.33	10.75±3.34	55.39±10.82	15.66±6.10
Single	13.43±4.51	16.36±4.34	14.00±5.05	11.16±3.18	53.62±11.91	18.37±7.12
	t:0.420, *p > .05*	t:1.127, ***p < .05***	t:0.803, *p > .05*	t:0.683, *p > .05*	t:0.836, *p > .05*	t:2.237, *p < .001*
Perceived level of income						
Income > expenditure	11.08±3.71	16.34±4.67	14.00±4.65	11.06±3.51	54.49±11.83	14.52±6.54
Income = expenditure	11.06±2.60	16.10±3.84	14.73±4.76	10.57±2.76	54.46±7.93	15.02±5.81
Income < expenditure	14.28±3.54	16.09±4.49	15.19±5.43	11.42±3.59	57.00±9.61	17.85±5.95
	F:2.837, ***p < .001***	F: 0.053, *p > .05*	F: 1.265, *p > .05*	F:1.265, *p > .05*	F: 0.581, *p > .05*	F: 3.069, *p < .001*
Work Status						
Working	13.16±3.82	15.00±3.52	13.16±3.67	10.58±3.64	51.90±9.53	13.67±8.87
Unemployed	17.13±3.52	16.39±4.36	14.85±4.56	11.21±3.35	55.62±11.21	16.76±6.17
	t:1.499, ***p < .05***	t:1.680, ***p < .05***	t:1.943, ***p < .05***	t:0.955, *p > .05*	t:1.736, ***p < .001***	t:2.537, ***p < .001***
Elderly's residence						
Province	13.35±3.83	17.30±4.68	15.30±5.12	11.60±3.47	57.55±12.27	14.90±6.17
District	12.95±3.07	15.46±3.30	14.69±4.38	11.13±3.25	54.25±10.39	15.66±6.33
Village	13.29±3.77	16.27±4.43	14.19±4.19	10.91±3.55	54.68±10.80	16.91±6.61
	F:0.226, *p > .05*	F: 2.346, ***p < .001***	F: 0.902, *p > .05*	F:0.574, *p > .05*	F: 1.258, *p > .05*	F: 1.685, *p > .05*

Table 2. Socio-demographic characteristics by DDS and GDS scores (Continue)

Diabetes Distress Scale	Emotional burden Distress mean±SD	Regimen related Distress mean±SD	Physician-related Distress mean±SD	Diabetes-related interpersonal Distress mean±SD	DDS Mean±SD	GDS Mean±SD
Living arrangement						
Alone	12.78±1.98	14.94±2.69	15.15±3.56	12.15±2.63	55.05±6.05	17.26±6.27
Living with spouse	13.23±3.39	16.17±4.28	14.52±3.97	10.68±3.33	54.62±10.23	15.43±6.07
Living with children/relatives	13.53±3.78	18.50±8.36	14.57±5.16	11.89±3.56	56.39±11.62	17.17±6.72
Other	11.25±6.34	16.39±3.78	14.00±7.63	9.75±3.15	53.50±22.90	15.50±7.34
	KW:1.050, *p > .05*	KW: 1.369, *p > .05*	KW: 0.155, *p > .05*	KW:2.727, ***p < .05***	KW: 0.384, *p > .05*	KW: 1.209, *p > .05*

t: Independent Sample t test, KW: Kruskal-Wallis H, F: ANOVA, *p < .05*, DDS: Diabetic Distress Scale, GDS: Geriatric Depression Scale, SD: Standart Deviation

Table 3. Diabetes characteristics of elderly by DDS and GDS scores

Diabetes Distress Scale	Emotional burden Distress Mean±SD	Regimen related Distress Mean±SD	Physician-related Distress Mean±SD	Diabetes-related interpersonal Distress Mean±SD	DDS Mean±SD	GDS Mean±SD
Diagnosis duration						
1-5 years	11.25±3.63	11.14±3.20	12.02±3.20	10.20±3.12	52.30±9.45	15.12±6.35
6-10 years	12.47±2.14	12.46±3.66	13.32±3.46	10.09±3.22	53.17±7.32	15.42±6.56
>11 years	13.66±2.20	17.85±4.17	13.23±3.31	11.42±3.07	57.85±9.78	18.58±6.48
	KW:1.478	KW: 4.452	KW: 0.752	KW:0.364	KW: 5.420	KW: 4.765
	p > .05	***p < .05***	*p > .05*	*p > .05*	***p < .05***	***p < .05***
Regularly blood glucose checking status	13.12±3.41	15.42±4.65	13.36±3.24	11.45±3.28	51.12±8.45	17.54±5.94
Yes	13.20±3.08	15.24±4.28	13.47±3.46	11.36±3.07	57.69±9.05	13.18±6.12
No	MWU:0.652, *p > .05*	MWU:0.563, *p > .05*	MWU:0.166, *p > .05*	MWU:0.245, *p > .05*	MWU:4.948, ***p < .001***	MWU:3.428 ***p < .001***
Diabetes-related complications	12.46±3.13	15.42±4.52	12.24±4.32	10.57±3.87	57.88±9.43	18.12±6.14
Yes	12.65±3.43	15.74±4.07	12.88±4.10	11.50±3.6	51.06±6.41	14.23±5.24
No	t:0.654, *p > .05*	t:0.346, *p > .05*	t:0.240, *p > .05*	t:0.134, *p*>0.05	t:2.474, ***p < .001***	t:2.289, ***p < .001***
Total HbA1c level						
<5	12.17±2.35	14.25±3.32	14.89±5.23	11.78±3.72	51.11±6.09	13.15±5.22
5-10	13.63±3.14	15.63±4.65	14.23±5.18	12.35±2.65	53.25±6.35	13.43±6.18
>10	13.78±3.25	15.74±4.12	14.64±5.64	12.41±3.88	57.88±10.74	17.89±7.72
	KW:0.150	KW: 0.367	KW: 0.089	KW:0.328	KW: 11.841	KW: 10.189
	p > .05	*p > .05*	*p > .05*	*p > .05*	***p < .001***	***p < .001***

t: Independent Sample t test, KW: Kruskal-Wallis H, F: ANOVA, *p* < .05, DDS: Diabetic Distress Scale, GDS: Geriatric Depression Scale, SD: Standart Deviation

Table 4. Elderly's DDS and GDS score averages

DDS	Mean±SD	Min-Max
DDS- Emotional Burden	1.31±0.35	0.6-2.2
DDS - Regimen Distress	1.62±0.42	0.6-2.9
DDS – Physician Distress	1.45±0.44	0.5-2.4
DDS - Interpersonal Distress	1.11±0.33	0.4-1.8
DDS -Total	5.51±1.09	2.7-5.8
GDS	16.10±6.34	2.00-30.00

DDS: Diabetic Distress Scale, GDS: Geriatric Depression Scale, SD: Standart Deviation, Min: Minimum, Max: Maximum

Table 5. Correlation between elderly's DDS and GDS score averages

		GDS
DDS	r	0.274
	p	***p < .001***

* r: Sperman Correlation Coefficient

Discussion

This study was conducted to examine the relationship between diabetes-related stress and depression in the elderly with type 2 DM. It was determined that patients had high diabetes-related stress levels and moderate depression levels. As geriatric depression increased, the stress experienced by the patients also increased.

The domain deficit score (DDS) emotional burden distress subscale mean score of elderly diabetes patients included in this study was found to be higher in illiterate, low income, and unemployed elderly. Similarly, a study that the psychosocial adjustment of diabetic patients with low education, low income, and unemployment was low (Çaklılı et al., 2020). Moreover, Naskar et al. (2017) determined that individuals with diabetes who have low income and educational level have problems psychologically adapting to the disease (Naskat et al.,2017). The literature stated that having a regular and sufficient income is an important factor in developing healthy living behaviors and psychosocial adaptation in patients (Polonsky et al., 2005; Çaklılı et al., 2020; Yesavage et al., 1983; Ertan & Eker; 2000; Naskar et al., 2017). The necessity of the existence and competence of material and spiritual resources about the disease so that the sick individual can adapt to the disease (Tahanakwang et al., 2014). Previous studies showed that low-income individuals lack adequate support and resources to effectively manage diabetes (Tahanacwang et al., 2014; Vu et al., 2018; Polonsky et al., 2005; Çaklılı et al., 2020). Moreover, the emotional burden is more vulnerable in the psychological health of diabetic patients. Living with illness requires rigorous management including taking medicines, obligations with regards to diet, physical activity, and heedful monitoring to control glucose/insulin level in the body. Thus, patients get frustrated and feel overwhelmed by emotional burden (Kocaman et al., 2007; Tahanacwang et al., 2014; Vu et al., 2018; Polonsky et al., 2005; Çaklılı et al., 2020).

The regimen-related distress subscale mean score was found to be higher and statistically significant in the single, unemployed, village-dwelling elderly people diagnosed with diabetes >10 years. Sidhu et al. (2017) and Ell et al. (2015) found that the level of regimen-related distress is high in elderly people who have received diabetes treatment for a long time, depending on the stemming of concerns about diet, physical activity, and medication (Sidhu et al., 2017; Ell et al., 2015). Also, when the literature is examined, Kasteleyn et al. (2015) stated that the problems related to diabetes increase as the duration of diabetes increases (Kasteleyn et al., 2015; Hessler et al., 2015). Furthermore, a study found that as the duration of diabetes increases, the adherence to treatment of chronic diseases due to diabetes decreases (Rasmussen et al., 2011). In this study, the social support needs of the elderly also increased due to the presence of other different chronic diseases other than diabetes. Therefore, the average scores of the distress related to the treatment regimen and compliance of the single and unemployed elderly are considered high.

The physician-related distress subscale mean score was found to be higher in illiterate and nonworking elderly patients and was statistically significant. Similarly, Sidhu et al. (2017) and Hessler et al. (2015) found that diabetic patients do not attend regular medical visits and are not conscious enough of their disease (Sidhu et al., 2017; Hessler et al., 2015). Tudies found that patients' follow-up compliance was insufficient in their studies with diabetic patients (Knech et al., 2011; Naskar et al., 2017). Moreover, another study diabetes individuals were inadequately compliant with follow-up, diet, and treatment (Siddiqui, 2014). The fact that the patients are elderly and have low education levels can be considered as the reason for this situation.

The diabetes-related interpersonal distress subscale mean score was found to be higher and statistically significant in the elderly in the 75–84 age group, with high school education and above, and living alone. In chronic diseases, support from the family and the environment is an important resource in coping and adapting to the disease (Rasmussen, 2011). The literature stated that the individual's mental state and social life are also negatively affected depending on the physiopathological changes that occur due to diabetes (Sidhu et al., 2017; Türten Kaymaz & Akdemir, 2016; Ell et al., 2015; Kastaleyn et al., 2015; Hessler et al., 2015). The study conducted by Kocaman et al. (2007) with individuals with chronic diseases determined that the most affected areas were professional life and social environment (Kocaman et al., 2007). Many studies, the area where the best adaptation to diabetes was observed was associated with the extended family (Ell et al., 2015; Kastaleyn et al., 2015; Tahanacwang et al., 2014). Elderly who have family communication and support positively affect adaptation to the disease and social life. Lack of family support, an important element of social support in the elderly living alone, causes the elderly to be unable to cope with illnesses, increase illness-specific problems, and reduce the quality of life by causing adjustment disorders and psychosocial problems (Siddiqui et al.,

2014). Furthermore, a study found higher mean depression scores and lower physical and mental subdimensions of quality of life in elderly people living alone (Chin et al., 2017). Following the literature, the high average score for distress due to interpersonal relationships is thought to be that the 75–84 age group experiences complications due to diabetes, their social support is insufficient because they live alone, and their adaptation to lifestyle changes and illness is low (Adakan et al., 2017; Aljohani et al., 2021).

DDS and GDS mean scores of high school education and above were found to be higher in elderly people who did not work, who had been diagnosed with diabetes for >11 years, who did not regularly measure blood glucose levels, and who have diabetes-related complications and HbA1c levels >11. This study determined that they experienced at least one complication due to diabetes and 82%, at most, had cardiovascular complications of diabetes.

A study that individuals with high educational status and those who do not work have a low adaptation to diabetes (Chin et al., 2017). Moreover, studies have reported that depression levels increase in the elderly who develop complications due to diabetes (Rasmussen et al., 2011; Mazanec et al., 2011; Kocaman et al., 2007; Tahanacwang et al., 2014; Vu et al., 2014; Polonsky et al., 2005).

A study found that individuals with complications due to diabetes have low quality of life and high levels of depression and distress (Adakan et al., 2017). Furthermore, studies found that depression and disability significantly increased as the rate of complications due to diabetes increased (Kocaman et al., 2007; Tahanacwang et al., 2014; Vu et al., 2014; Polonsky et al., 2005, Çaklılı et al., 2020; Yesavege et al., 1983).

Similarly, a study stated that as the duration of diabetes increases, complications associated with diabetes and accordingly stress levels increase (Kastaleyn et al., 2015). Vu et al. (2014) found that elderly people with a high level of education, who have been diagnosed with diabetes for a long time, have an irregular blood glucose level, and have high levels of diabetes-related complications and HbA1c also have a high level of depression (Vu et al., 2014). Chin et al. (2017) found that the depressive symptoms of elderly diabetic patients who were single and diagnosed with diabetes for >10 years were identified to be associated with diabetes control and had significantly higher plasma glucose and HbA1c concentration (Chin et al., 2017).

GDS average score; female, singles were found to be higher in the elderly with low income and statistically significant ($p < .05$)

Studies observed that female patients had difficulties psychologically adjusting to diabetes and women with diabetes have low psychological adjustment levels (Naskar et al., 2017; Chin et al., 2017; Adakan et al., 2017). A study found that female, single, and low-income diabetic patients have high levels of depression (Adakan et al., 2017). Furthermore, Vu et al. found that the levels of depression are high in elderly diabetes patients who are women and single (Vu et al., 2014).

When the distribution of the scale mean scores was examined, the mean score of the DDS emotional burden distress subscale was 13.19 ± 3.55 (moderate level). Moreover, regimen-related, physician-related, and diabetes-related interpersonal distress were determined as 16.21 ± 4.26, 14.58 ± 4.45, and 11.12 ± 3.38 (high distress). The mean score of total DDS was 55.11 ± 10.99 (high distress) and the obtained mean GDS score was 16.10 ± 6.34 (high depression).

The total mean score of DDS, emotional burden distress, regimen-related distress, and depression levels increased. Moreover, a statistically significant and positive correlation was found between these scales. A positive and statistically significant relationship was found between DDS and depression scale. Similar to our study, depression and distress increased statistically significantly in Chin et al. (2017) study. Elderly diabetic patients who have received insulin and diet therapy for a long time have high levels of stress and depression (Chin et al., 2017; Adakan et al., 2017). Studies also emphasized that insulin-treated patients may more frequently experience some negative emotions (e.g., hopelessness, dissatisfaction, and feeling punished) compared with patients who received oral drug regimens (Chin et al., 2017; Adakan et al., 2017; Katon et al., 2004; Bai et al., 2018). Furthermore, determined that depressive symptom and diabetes-related stress levels are high in elderly diabetic patients (Katon et al., 2004). Sidhu et al., (2017) diabetes distress, and depression were positively associated. Conversely, emotional burden and regimen-related distress subscales are the strongest correlates (Sidhu et al., 2017). In addition, Hessler et al. (2015) also identified a bidirectional association between regimen-related distress and depression (Hessler et al., 2015). This significant relationship between diabetes stress and depression experienced by patients may be caused by the patients' low level of education and their inability to control the disease due to non-compliance with the treatment regimen

Conclusion

In conclusion, the prevalence of diabetes-related distress and depression among patients with type 2 diabetes mellitus was high in this study. The elderly with high school and above have been found to have high levels of depression and distress in elderly people who do not work, have been diagnosed with diabetes for more than 11 years, do not measure their blood glucose level regularly, and have Diabetes-related complications and HbA1c levels >11. When the distribution of the scale mean scores was examined, the mean score of DDS subscales; Emotional Burden Distress was determined to moderate level. Regimen-Related Distress, Physician-Related Distress and Diabetes-Related Interpersonal Distress were determined to high level. The mean score of Total DDS was high distress and the obtained mean score mean score of GDS was high depression. It was determined that as the total mean score of DDS, Emotional burden Distress and Regimen related Distress levels increased, depression level increased. A statistically significant and positive correlation was found between these scales.

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References

Adakan, F.Y., Vural, R., Boylubay, Ş.M., Yılmaz, Ü., Kulaksızoğlu, B., Yeşil, B., Şahintürk, Y., & Ünal, A. (2017). The relation of socio-demographic and clinical factors to depression and anxiety levels in diabetic patients. *Konuralp Medical Journal,* 96-105. https://doi.org/10.18521/ktd.289610

Aljohani, W., Algohani, L., Alzahrani, A., Bazuhair, M., Bawakid, A., Aljuid, L., & Al-Ahdal, A. (2021). Prevalence of depression among patients with type 2 diabetes at king Abdullah Medical City. *Cureus, 13*(10). https://doi.org/ 10.7759/cureus.18447

Bai, X., Liu, Z., Li, Z., & Yan, D. (2018). The association between insulin therapy and depression in patients with type 2 diabetes mellitus: a meta-analysis. *BMJ Open, 8*(11), e020062. https://doi.org/10.1136/ bmjopen-2017-020062

Çakllılı, Ö. T., Feyizoğlu, G., Çolak, S. T., Dizman, N., Çakir, S. I. B., & Oğuz, A. (2020). Reliability and validity of the Turkish version of the Diabetes Distress Scale for type 2diabetes and distress levels of the participants. *Turkish Journal of Medical Sciences, 50*(2), 464-470. https://doi.org/10.3906/sag-1903-121

Chin, Y. W., Lai, P. S. M., & Chia, Y. C. (2017). The validity and reliability of the English version of the diabetes distress scale for type 2 diabetes patients in Malaysia. *BMC Family Practice, 18*, 1-8. https://doi.org/10.1186/s12875-017-0601-9

Ell, K., Katon, W., Lee, P. J., Guterman, J., & Wu, S. (2015). Demographic, clinical and psychosocial factors identify a high-risk group for depression screening among predominantly Hispanic patients with Type 2 diabetes in safety net care. *General Hospital Psychiatry, 37*(5), 414-419. https://doi.org/10.1016/j.genhosppsych.2015.05.010

Ertan, T., & Eker, E. (2000). Reliability, validity, and factor structure of the geriatric depression scale in Turkish elderly: are there different factor structures for different cultures?. International *Psychogeriatrics, 12*(2), 163-172. https://doi.org/10.1017/S1041610200006293

Hessler, D., Fisher, L., Strycker, L. A., Arean, P. A., & Bowyer, V. (2015). Causal and bidirectional linkages over time between depression and diabetes regimen distress in adults with type 2 diabetes. *Diabetes Research and Clinical Practice, 108*(2), 360-366. https://doi.org/10.1016/j.diabres.2015.12.017

Kasteleyn, M. J., de Vries, L., Van Puffelen, A. L., Schellevis, F. G., Rijken, M., Vos, R. C., & Diacourse study group. (2015). Diabetes-related distress over the course of illness: results from the Diacourse study. *Diabetic Medicine, 32*(12), 1617-1624. https://doi.org/10.1111/dme.12743

Katon, W., Von Korff, M., Ciechanowski, P., Russo, J., Lin, E., Simon, G., ... & Young, B. (2004). Behavioral and clinical factors associated with depression among individuals with diabetes. *Diabetes Care, 27*(4), 914-920. https://doi.org/10.2337/diacare.27.4.914

Kneck, A., Klang, B., & Fagerberg, I. (2011). Learning to live with illness: experiences of persons with recent diagnoses of diabetes mellitus. *Scandinavian Journal of Caring Sciences, 25*(3), 558-566. https://doi.org/10.1111/j.1471-6712.2010.0864.x

Kocaman, N., Kutlu, Y., Özkan, M., & Özkan, S. (2007). Predictors of psychosocial adjustment in people with physical disease. *Journal of Clinical Nursing, 16*(3a), 6-16. https://doi.org/10.1111/j.1365-2702.2006.01809.x

Mazanec, S. R., Daly, B. J., Douglas, S., & Musil, C. (2011). Predictors of psychosocial adjustment during the postradiation treatment transition. *Western Journal of Nursing Research, 33*(4), 540-559. https://doi.org/10.1177/0193945910382241

Naskar, S., Victor, R., & Nath, K. (2017). Depression in diabetes mellitus—A comprehensive systematic review of literature from an Indian perspective. *Asian Journal of Psychiatry, 27*, 85-100. https://doi.org/10.1016/j.ajp.2017.02.018

Polonsky, W.H., Fisher, L., Earles, J., Dudl, R.J., Lees, J., Mullan, J., & Jackson R.A. (2005). Assessing psychosocial distress in diabetes: development of the diabetes distress scale. *Diabetes Care, 28* (3), 626–631. https://doi.org/10.2337/diacare.28.3.626

Rasmussen, B., Ward, G., Jenkins, A., King, S. J., & Dunning, T. (2011). Young adults' management of Type 1 diabetes during life transitions. *Journal of Clinical Nursing, 20*(13-14), 1981-1992. https://doi.org/10.1111/j.1365-2702.2010.03657.x

Rintala, T. M., Jaatinen, P., Paavilainen, E., & Astedt-Kurki, P. (2013). Interrelation between adult persons with diabetes and their family: a systematic review of the literature. *Journal of Family Nursing, 19*(1), 3-28. doi.org/10.1177/1074840712471899

Siddiqui, S. (2014). Depression in type 2 diabetes mellitus—a brief review. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 8*(1), 62-65. https://doi.org/10.1016/j.dsx.2013.06.010

Sidhu, R., & Tang, T. S. (2017). Diabetes distress and depression in South Asian Canadians with type 2 diabetes. *Canadian Journal of Diabetes, 41*(1), 69-72. https://doi.org/10.1016/j.jcjd.2016.07.008

Thanakwang, K., Thinganjana, W., & Konggumnerd, R. (2014). Psychometric properties of the Thai version of the Diabetes Distress Scale in diabetic seniors. *Clinical Interventions in Aging,* 1353-1361. https://doi.org/10.2147/cia.s67200

Türten Kaymaz, T., & Akdemir, N. (2016). Psychosocial adjustment to disease in individuals with diabetes. *Journal of Psychiatric Nursing, 7*(2), 61-67. https://doi.org/10.5505/phd.2016.50251

Vu, H. T. T., Nguyen, T. X., Nguyen, H. T. T., Le, T. A., Nguyen, T. N., Nguyen, A. T., ... & Ho, R. C. (2018). Depressive symptoms among elderly diabetic patients in Vietnam. *Diabetes, Metabolic*

Syndrome and Obesity: Targets and Therapy, 659-665. https://doi.org/10.2147%2FDMSO.S179071

Yesavage, J. A., Brink, T. L., Rose, T. L., Lum, O., Huang, V., Adey, M., & Leirer, V. O. (1982). Development and validation of a geriatric depression screening scale: a preliminary report. *Journal of Psychiatric Research, 17*(1), 37-49. https://doi.org/10.1016/0022-3956(82)90033-4.