Original Research

Evaluation of Anxiety, Depression, and Health-Related Quality of Life in Female and Male Patients With Newly Diagnosed Type 2 Diabetes

Kagan Ucok[1] iD, Akif Acay[2] iD, Kerem Senol Coskun[3] iD, Ahmet Hamdi Alpaslan[4] iD, Necip Fazil Coban[1], Gokhan Akkan[1] iD, Idris Kaya[1] iD, Cemil Celikagi[1] iD, Esin Damra Coban[1], Omer Ozbulut[3] iD

[1]Department of Physiology, Faculty of Medicine, Afyon Kocatepe University, Afyonkarahisar, Turkey
[2]Department of Internal Medicine, Faculty of Medicine, Afyon Kocatepe University, Afyonkarahisar, Turkey
[3]Department of Psychiatry, Faculty of Medicine, Afyon Kocatepe University, Afyonkarahisar, Turkey
[4]Department of Child and Adolescent Psychiatry, Faculty of Medicine, Afyon Kocatepe University, Afyonkarahisar, Turkey

Correspondence Author:
Email: kaganucok@gmail.com

Abstracts

Introduction: Depending on the disease's stage, type 2 diabetes can impact anxiety, depression, and health-related quality of life. This study aimed to compare the health-related quality of life, anxiety, and depression of men and women recently diagnosed with type 2 diabetes to that of healthy controls. **Methods:** There were 100 newly diagnosed type 2 diabetic patients (50 females and 50 males), as well as 100 healthy controls (50 females and 50 males). Each participant receives three questionnaires: the Short-Form Health Survey (SF-36), the Beck Depression Inventory (BDI), and the Beck Anxiety Inventory (BAI). **Results:** Compared to controls, patients' scores on the SF-36 for total, physical, and mental health were lower for both genders. Compared to controls, the female patients' BAI and BDI scores were greater. Both male and female diabetes patients had a negative correlation between their SF-36 total score and fasting plasma glucose. Additionally, the female patients' fasting plasma glucose and BDI score showed a positive correlation. **Conclusions:** In both genders, patients with recently diagnosed type 2 diabetes had a lower health-related quality of life compared to controls. However, the anxiety and depression levels of only female diabetic patients worsened when compared to controls. We suggest considering gender differences in the symptomatology of anxiety and depression among newly diagnosed type 2 diabetic patients to develop more effective ways to manage their condition, such as comprehensive and early intervention.

Keywords: Type 2 diabetes, Anxiety, Depression, Quality of life

INTRODUCTION

Type 2 diabetes mellitus is a complex metabolic disorder that affects a large number of individuals worldwide. Multiple health authorities have evaluated the disease's alarming prevalence, even though it is not contagious [1]. It is associated with obesity, metabolic and cardiovascular illnesses, and psychiatric issues. Individuals diagnosed with diabetes have a higher likelihood of experiencing psychological symptoms such as depression and anxiety. Farooqi et al. [2] An analysis of 44 research found that those with type 2 diabetes had a notably higher occurrence of depression compared to those without diabetes. Multiple research centers conducted a study that found 57.9% of persons with type 2 diabetes experienced anxiety, and 43.5% experienced depression [3]. Furthermore, distinct socioeconomic factors such as age, gender, employment status, and level of education link to these psychiatric disorders [4–6]. Gonzalez Heredia et al. [7] According to Gonzalez Heredia et al. [7], people with type 2 diabetes who suffer from anxious depression symptoms are more likely to show reduced treatment adherence, and anxiety is associated with suboptimal glycemic control. Newly diagnosed patients with type 2 diabetes may sometimes face a significant struggle due to these added problems.

Men and women with type 2 diabetes may experience substantial effects on anxiety, depression, and health-related quality of life (HRQoL), among other disease-related factors. However each progression phase and gender may see different modifications in these components, and these variations can have a big effect on the patient's general health. Therefore, by identifying the compromised disease-related components, healthcare providers can devise more effective treatment plans for newly diagnosed diabetic patients. In the current study, we aimed to compare the levels of anxiety, depression, and HRQoL among male and female patients recently diagnosed with type 2 diabetes with those of healthy controls.

METHODS

This study designed a comparison of depression, anxiety, and HRQoL between type 2 diabetic patients and controls as an analysis method. The Afyon Kocatepe University Ethical Committee of Clinical Research, the local ethical committee, approved the study protocol. All volunteers, including the controls and patients, signed informed consent papers.

Subjects

An internal medicine specialist preselected patients with type 2 diabetes from the Afyon Kocatepe University Medical Faculty Hospital's Internal Medicine Clinic for this study. The American Diabetes Association guidelines [8], guided the diagnosis of type 2 diabetes. The following criteria were applied: The fasting plasma glucose (FPG) level was ±126 mg/dl (7 mmol/L); during an oral glucose tolerance test, the second-hour plasma glucose level was ± 200 mg/dL (11.1 mmol/L); the randomly-plasma glucose level was ± 200 mg/dL (11.1 mmol/L); and the value of the HbA1c was ± 6.5%. These findings were correlated with hyperglycemia symptoms.

Volunteer hospital employees and those who accompanied family members on hospital visits made up the controls. The patients' new-found type 2 diabetes diagnosis was the inclusion criterion. The following conditions were excluded: We excluded conditions such as malignancy, acute infection, dehydration, psychiatric disorders like psychosis, musculoskeletal, cardiovascular, pulmonary, and renal diseases, as well as metabolic diseases other than diabetes. This study comprised 100 patients with newly diagnosed type 2 diabetes (50 men and 50 women) and 100 healthy controls (50 men and 50 women). We matched the patients with healthy controls based on their age and body mass index (BMI) in both genders. Interviews determined the smoking status (pack years) of all individuals. We obtained BMI using height and weight (kg/m2).

Beck Anxiety Inventory (BAI)

People frequently use the BAI to assess anxiety severity through self-reporting. Beck et al. were the ones who initially created BAI [9]. Ulusoy and colleagues in Turkey studied its validity and reliability [10]. This inventory not only identifies the physiological, cognitive, and emotional symptoms of anxiety but also distinguishes them from those of depression [11]. With 21 items, the BAI is a four-point Likert type scale. There are four potential responses for each question [12]. The responses are "Not at all" (0 points), "It did not bother me much" (1 point), "It was very unpleasant, but I could stand it" (2 points), and "I could barely stand it" (3 points). The elevated scores suggest an increase in anxiety symptoms, and 63 is the highest possible score [13].

Beck Depression Inventory (BDI)

Beck and colleagues developed the BDI [14]. Hisli completed a validity investigation on the BDI in Turkey [15]. The inventory's purpose is to objectively determine the degree of depression symptoms, not to make a depression diagnosis [16]. The BDI is a self-reported measure consisting of 21 items and four statements for each item. The maximum score is 63 points, and higher values show that depressive symptoms are more severe.

The Short-Form Health Survey (SF-36)

A popular tool for assessing HRQoL is the self-report health survey questionnaire, the SF-36. In Turkey, Kocyigit et al. conducted its validity and reliability testing [17]. The SF-36 contains 36 items, an eight-scale score profile, and measurements of both mental and physical health. We converted the eight-scale results into scores on a 0–100 scale. We then determined scores for mental, physical, and total health [18]. Higher values indicate better HRQoL.

Statistical analysis

We analyzed the study data using the Statistical Package for the Social Sciences (SPSS) (SPSS Inc., Chicago, IL, USA). We examined the group's distribution using the Kolmogorov-Smirnov test. We determined the differences between the groups using either the Mann-Whitney U-test or the Student's t-test. We examined the correlations between the parameters using Kendall's tau or Pearson correlation tests. Each study group's results were presented as "mean ± standard deviation." We set a P-value of 0.05 as the significance level in the statistical analysis.

RESULT

We invited 206 people to participate in our study, but six declined. Tables 1 and 2 display the mean values of age, BMI, smoking, FPG, SF-36, BAI, and BDI scores for the male and female patients with newly diagnosed diabetes, along with the healthy controls. When compared to the controls, patients with type 2 diabetes showed significantly lower scores on the SF-36 for both genders in terms of total, physical health, and mental health (Tables 1 and 2). The BAI and BDI scores of the female patients significantly exceeded those of the controls (Table 1). However, Table 2 indicates that there was no significant difference in the BAI and BDI scores between male patients and the control group values. In both genders, there was no statistically significant difference in the mean age, BMI, or smoking (pack-years) between the diabetic patients and the healthy controls (Tables 1 and 2).

Table 1. Age, BMI, smoking, FPG, BAI, BDI, and SF-36 values of women with newly diagnosed type 2 diabetic patients and healthy controls.

	Patients (n = 50)	Controls (n = 50)	P-value
Age (year)	52.4 ± 7.3	51.3 ± 7.5	0.525
BMI (kg/m²)	32.3±5.2	32.1±5.7	0.852
Smoking (pack-years)	3.2 ± 6.3	3.0 ± 6.2	0.534
FPG (mg/dL)	185.2 ± 81.4	89.9 ± 10.2	**<0.001**
BAI Score	14.5 ± 10.1	9.0 ± 8.7	**0.012**
BDI Score	12.9 ± 8.4	8.2 ± 5.0	**0.004**
SF-36 Total Score	70.8±9.9	78.7±10.6	**0.005**
SF-36 Physical Health Score	69.7±9.5	77.3±10.2	**0.007**
SF-36 Mental Health Score	72.8±10.2	80.2±11.0	**0.012**

BMI: Body mass index; FPG: Fasting plasma glucose; BAI: Beck anxiety inventory; BDI: Beck depression inventory; SF-36: Short-form health survey.

Table 2. Age, BMI, smoking, FPG, BAI, BDI, and SF-36 values of men with newly diagnosed type 2 diabetic patients and healthy controls.

	Patients (n = 50)	Controls (n = 50)	P-value
Age (year)	51.4 ± 6.9	50.2 ± 7.0	0.503
BMI (kg/m^2)	30.0±3.6	29.5±3.2	0.872
Smoking (pack-years)	2.9 ± 6.4	2.0 ± 6.2	0.445
FPG (mg/dL)	220.1 ± 98.8	91.8 ± 9.7	**<0.001**
BAI Score	7.1 ± 6.3	6.8 ± 5.9	0.811
BDI Score	7.2 ± 4.5	7.5 ± 5.0	0.835
SF-36 Total Score	78.5±10.2	85.3±10.1	**0.026**
SF-36 Physical Health Score	78.2±10.0	87.1±11.3	**0.008**
SF-36 Mental Health Score	79.5±10.6	84.3±9.9	**0.033**

SF-36: Short-form health survey; BMI: Body mass index; BAI: Beck anxiety inventory; BDI: Beck depression inventory; FPG: Fasting plasma glucose.

Table 3 displayed only the statistically significant associations between FPG and the questionnaires (BAI, BDI, and SF-36 Total Score) for both female and male patients with newly diagnosed diabetes. The FPG and the SF-36 total score in diabetes individuals showed a negative correlation in both genders (Table 3). Additionally, in the female patients, a positive correlation was found between the BDI score and the FPG (Table 3).

Table 3. The correlations of FPG with the questionnaires (BAI, BDI, SF-36 Total Score) in male and female newly diagnosed type 2 diabetic patients.

	FPG (mg/dL)			
	Male patients		Female patients	
	r value	P value	r value	P value
BAI Score	NS	NS	NS	NS
BDI Score	NS	NS	0.328	0.004
SF-36 Total Score	-0.241	0.036	-0.245	0.031

NS: Not Significant; SF-36: Short-form health survey; BAI: Beck anxiety inventory; BDI: Beck depression inventory; FPG: Fasting plasma glucose.

DISCUSSION

We compared the energy expenditure and physical fitness metrics of patients with newly diagnosed type 2 diabetes with those of healthy controls in a previous study [19]. When we compared male and female patients with type 2 diabetes to healthy controls, we found that they had higher levels of central obesity and adiposity, as well as lower levels of total energy expenditure, daily physical activity, aerobic exercise capacity, and muscular strength assessments. Furthermore, when comparing the male patients to the controls, there was a decrease in lean body mass, which includes muscle mass. Thus, in this larger sample study, we chose to examine physical fitness-related parameters, including HRQoL, and the symptomatology of anxiety and depression. However, since we did not investigate the relationship between these parameters and HRQoL, anxiety, or depression, we are unable to state this clearly.

This study compared the anxiety, depression, and HRQoL of individuals with type 2 diabetes who had recently received their diagnosis to those of healthy controls in both genders. We also performed an association analysis between fasting plasma glucose and factors related to anxiety, depression, and quality of life. None of the groups' mean ages, BMIs, or smoking rates showed a significant difference (Tables 1 and 2). Trento et al. [20] found a link between female gender and depression in diabetic patients. Melin et al. [21] found that compared to younger men, younger women had a higher prevalence of depression and anxiety in patients with newly diagnosed type 2 diabetes. In line with the mentioned above studies, only female diabetic patients showed impaired anxiety and depression symptomatology when compared to non-diabetic controls (Tables 1 and 2). Additionally, in female patients, there was a positive correlation between the fasting glucose level and depressive symptomatology (Table 3). Recent experience with type 2 diabetes or diabetes-related impairments appears to be one of the factors that adversely affect the HRQoL in both genders, but only in female patients' cases does it significantly affect the symptomatology of depression and anxiety.

According to Skinner et al. [22], 18–22% of individuals with type 2 diabetes who had just received their diagnosis had depression

symptoms at some point throughout the year. The 12% normative value for the general population was not significantly different from this result, they noted. They did note, nevertheless, that during the first year of type 2 diabetes, more than 20% of patients exhibited depressive symptoms to some extent. According to Thoolen et al. [23], newly diagnosed patients with type 2 diabetes typically do not experience many problems with their illness in the first few years. However, early and intense treatment for type 2 diabetes can cause considerably higher anxiety and lower self-efficacy in the first year of the condition [23]. In the current investigation, we found that compared to the controls, female patients with recently diagnosed type 2 diabetes had significantly higher BDI and BAI scores (Tables 1 and 2). Furthermore, Table 3 shows a positive correlation between the FPG value and the BDI score in female patients. These early findings imply the possibility of diabetes and additional diabetes-related variables that adversely impact the quality of life and symptomatology of anxiety and depression in patients recently diagnosed with type 2 diabetes.

Velázquez-Jurado et al. [24] investigated the effects of cognitive-behavioral treatment on psychological adjustment in patients recently diagnosed with type 2 diabetes and found that the quality of life, diabetes-related distress, anxiety, and depression questionnaire values and metabolic variables significantly improved after treatment and were maintained at follow-up. They emphasized the importance of considering psychological factors as part of comprehensive diabetes care to improve quality of life and emotional burden, as well as facilitate achieving metabolic goals. When prescribing severe diabetes therapy for the first time, we recommend that practitioners examine their patients' psychological status and requirements. In the early stages of type 2 diabetes, healthcare providers should also concentrate on lowering patients' anxiety and depression levels, improving social support, and mak-

ing referrals to psychiatry specialists [25]. Anxiety and depression symptoms have a detrimental effect on the degree of acceptance of the condition and considerably reduce the HRQoL in diabetic patients, according to Lewko et al. [26]. Adriaanse et al. [27] conducted a comparison between 49 newly diagnosed patients with type 2 diabetes and 116 patients identified through screening. They found that newly diagnosed individuals had lower mean values for the SF-36 mental health scores. Here, when we compared newly diagnosed type 2 diabetic patients to healthy controls, we revealed that both male and female patients had lower total, physical health, and mental health SF-36 scores (Tables 1 and 2). Additionally, in both genders of diabetes patients, the FPG demonstrated a negative correlation with the SF-36 total score (Table 3). We believe that individuals with type 2 diabetes who have just received a diagnosis will be better able to accept their illness and, therefore, experience less difficulty managing their diabetes if they receive psychological support.

Study limitation: This research compares newly diagnosed individuals with type 2 diabetes with healthy controls. Our findings thus do not support a cause-and-effect relationship.

CONCLUSION

Comparing newly diagnosed type 2 diabetes patients to healthy controls in both genders, we found that their HRQoL is worse. However, when compared to non-diabetic controls, only female diabetic patients experience a deterioration in their psychological state, especially depression and anxiety. We suggest that assessing anxiety and depression in newly diagnosed type 2 diabetics according to gender could lead to the development of more effective disease management approaches, such as early and thorough intervention.

ACKNOWLEDGEMENTS

REFERENCES

[1] B. Bakar and M. Buyukbese, "Diabetes Where Continents Meet: Turkey," Eur. J. Gen. Med., 2023.

[2] A. Farooqi et al., "A systematic review and meta-analysis to compare the prevalence of depression between people with and without Type 1 and Type 2 diabetes.," Prim. Care Diabetes, vol. 16, no. 1, pp. 1–10, Feb. 2022, doi: 10.1016/j.pcd.2021.11.001.

[3] A. K. Khuwaja, S. Lalani, R. Dhanani, I. S. Azam, G. Rafique, and F. White, "Anxiety and depression among outpatients with type 2 diabetes: A multi-centre study of prevalence and associated factors.," Diabetol. Metab. Syndr., vol. 2, p. 72, Dec. 2010, doi: 10.1186/1758-5996-2-72.

[4] T. M. da C. Daniele, V. M. S. de Bruin, D. S. N. de Oliveira, C. M. R. Pompeu, and A. C. E. Forti, "Associations among physical activity, comorbidities, depressive symptoms and health-related quality of life in type 2 diabetes.," Arq. Bras. Endocrinol. Metabol., vol. 57, no. 1, pp. 44–50, Feb. 2013, doi: 10.1590/s0004-27302013000100006.

[5] M. Palizgir, M. Bakhtiari, and A. Esteghamati, "Association of depression and anxiety with diabetes mellitus type 2 concerning some sociological factors.," Iran. Red Crescent Med. J., vol. 15, no. 8, pp. 644–648, Aug. 2013, doi: 10.5812/ircmj.12107.

[6] K. Ganasegeran, P. Renganathan, R. A. Manaf, and S. A. R. Al-Dubai, "Factors associated with anxiety and depression among type 2 diabetes outpatients in Malaysia: a descriptive cross-sectional single-centre study.," BMJ Open, vol. 4, no. 4, p. e004794, Apr. 2014, doi: 10.1136/bmjopen-2014-004794.

[7] T. Gonzalez Heredia, L. P. González-Ramírez, D. M. Hernández-Corona, and E. A. Maciel-Hernández, "Anxious depression in patients with Type 2 Diabetes Mellitus and its relationship with medication adherence and glycemic control.," Glob. Public Health, vol. 16, no. 3, pp. 460–468, Mar. 2021, doi: 10.1080/17441692.2020.1810735.

[8] "Introduction: Standards of Medical Care in Diabetes-2019.," Diabetes Care, vol. 42, no. Suppl 1, pp. S1–S2, Jan. 2019, doi: 10.2337/dc19-Sint01.

[9] A. T. Beck, N. Epstein, G. Brown, and R. A. Steer, "An inventory for measuring clinical anxiety: psychometric properties.," J. Consult. Clin. Psychol., vol. 56, no. 6, pp. 893–897, Dec. 1988, doi: 10.1037//0022-006x.56.6.893.

[10] M. Ulusoy, N. hisli sahin, and H. Erkmen, "Turkish Version of the Beck Anxiety Inventory: Psychometric Properties," J. Cogn. Psychother. Int. Q., vol. 12, 1998.

[11] L. K. Chapman, S. R. Williams, B. T. Mast, and J. Woodruff-Borden, "A confirmatory factor analysis of the Beck Anxiety Inventory in African American and European American young adults.," J. Anxiety Disord., vol. 23, no. 3, pp. 387–392, Apr. 2009, doi: 10.1016/j.janxdis.2008.12.003.

[12] H. Mollaoglu et al., "Association analyses of depression, anxiety, and physical fitness parameters in Turkish obese adults.," J. Back Musculoskelet. Rehabil., vol. 25, no. 4, pp. 253–260, 2012, doi: 10.3233/BMR-2012-0333.

[13] A. Genç et al., "Investigation of Daily Physical Activity, Anxiety and Depression in Patients with Cholelithiasis [Kolelitiyazis Hastalarında Günlük Fiziksel Aktivite, Anksiyete ve Depresyonun Araştırılması]," Kocatepe Tıp Derg., vol. 15, pp. 306–311, 2014, doi: 10.18229/ktd.63855.

[14] A. T. BECK, C. H. WARD, M. MENDELSON, J. MOCK, and J. ERBAUGH, "An inventory for measuring depression.," Arch. Gen. Psychiatry, vol. 4, pp. 561–571, Jun. 1961, doi: 10.1001/archpsyc.1961.01710120031004.

[15] N. Hisli, "Beck depresyon envanterinin

gecerligi uzerine bir calisma (A study on the validity of Beck Depression Inventory),” J. Psychol., vol. 22, no. 6, pp. 118–126, 1988.

[16] U. Sener et al., “Evaluation of health-related physical fitness parameters and association analysis with depression, anxiety, and quality of life in patients with fibromyalgia.,” Int. J. Rheum. Dis., vol. 19, no. 8, pp. 763–772, Aug. 2016, doi: 10.1111/1756-185X.12237.

[17] H. Koçyiğit, O. Aydemir, G. Fişek, N. Ölmez, and A. Memiş, “Kısa Form-36 (SF-36)’nın Türkçe Versiyonunun Güvenilirliği ve Geçerliliği. Reliability and Validity of the Turkish Version of Short Form-36 (SF-36),” İlaç ve Tedavi Derg., vol. 12, pp. 102–106, 1999.

[18] H. Yalcinkaya et al., “Do male and female patients with chronic neck pain really have different health-related physical fitness, depression, anxiety and quality of life parameters?,” Int. J. Rheum. Dis., vol. 20, no. 9, pp. 1079–1087, Sep. 2017, doi: 10.1111/1756-185X.12389.

[19] K. Ucok et al., “Do patients with newly diagnosed type 2 diabetes have impaired physical fitness, and energy expenditures?,” Neth. J. Med., vol. 73, no. 6, pp. 276–283, Jul. 2015.

[20] M. Trento et al., “Depression, anxiety, cognitive impairment and their association with clinical and demographic variables in people with type 2 diabetes: a 4-year prospective study.,” J. Endocrinol. Invest., vol. 37, no. 1, pp. 79–85, Jan. 2014, doi: 10.1007/s40618-013-0028-7.

[21] E. O. Melin et al., “Depression was associated with younger age, female sex, obesity, smoking, and physical inactivity, in 1027 patients with newly diagnosed type 2 diabetes: a Swedish multicentre cross-sectional study.,” BMC Endocr. Disord., vol. 22, no. 1, p. 273, Nov. 2022, doi: 10.1186/s12902-022-01184-3.

[22] T. C. Skinner et al., “Depressive symptoms in the first year from diagnosis of Type 2 diabetes: results from the DESMOND trial.,” Diabet. Med., vol. 27, no. 8, pp. 965–967, Aug. 2010, doi: 10.1111/j.1464-5491.2010.03028.x.

[23] B. J. Thoolen, D. T. de Ridder, J. M. Bensing, K. J. Gorter, and G. E. Rutten, “Psychological outcomes of patients with screen-detected type 2 diabetes: the influence of time since diagnosis and treatment intensity.,” Diabetes Care, vol. 29, no. 10, pp. 2257–2262, Oct. 2006, doi: 10.2337/dc06-0617.

[24] H. Velázquez-Jurado et al., “Cognitive behavioral treatment to improve psychological adjustment in people recently diagnosed with type 2 diabetes: Psychological treatment in type 2 diabetes.,” Heal. Psychol. Behav. Med., vol. 11, no. 1, p. 2179058, 2023, doi: 10.1080/21642850.2023.2179058.

[25] S.-F. V. Wu, L.-S. Young, F.-C. Yeh, Y.-M. Jian, K.-C. Cheng, and M.-C. Lee, “Correlations among social support, depression, and anxiety in patients with type-2 diabetes.,” J. Nurs. Res., vol. 21, no. 2, pp. 129–138, Jun. 2013, doi: 10.1097/jnr.0b013e-3182921fe1.

[26] J. Lewko, W. Zarzycki, and E. Krajewska-Kułak, “Relationship between the occurrence of symptoms of anxiety and depression, quality of life, and level of acceptance of illness in patients with type 2 diabetes.,” Saudi Med. J., vol. 33, no. 8, pp. 887–894, Aug. 2012.

[27] M. C. Adriaanse et al., “Health-related quality of life in the first year following diagnosis of Type 2 diabetes: newly diagnosed patients in general practice compared with screening-detected patients. The Hoorn Screening Study.,” Diabet. Med., vol. 21, no. 10, pp. 1075–1081, Oct. 2004, doi: 10.1111/j.1464-5491.2004.01277.x.