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

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ABSTRACT

الأهداف: تحديد معدل ظهور أعراض القلق والاكتئاب على المرضى المصابين بمرض السكري من النوع الثاني، وأيضًا تقييم العلاقة بين ظهور أعراض القلق والاكتئاب وجودة الحياة ومستوى تقبل المريض للمرض وذلك في شمال شرق بولندا.

الطريقة: أُجريت هذه الدراسة المقطعية على 126 مريضًا مصابًا بمرض السكري من النوع الثاني في قسم الغدد الصماء والسكري والأمراض الباطنة، جامعة بياليستوك الطبية، بياليستوك، بولندا وذلك خلال الفترة من فبراير 2010م إلى مارس 2011م. وتم توزيع ثلاثة استبيانات وهي كالتالي: معيار قياس القلق والاكتئاب بالمستشفى، ومعيار قياس تقبل المرض، ومعيار قياس SF–36v2.

النتائج: لقد لوحظ ظهور أعراض القلق على 30.4% من المرضى، وظهور أعراض الاكتئاب على 32% من المرضى. لقد كانت الأعراض أكثر حدوثًا لدى السيدات عنها لدى الرجال (20.6% مقابل 10.3% بالنسبة للقلق، و22.2% مقابل 10.3% بالنسبة للاكتئاب). وقد أظهر تحليل الانحدار المتعدد أن 50% من التفاوت على معيار قياس تقبل المرض أثّر على جودة الحياة فيما يتعلق بملخص المكوّن البدني (PCS) وملخص المكوّن العقلي (MCS).

خاتمة: تؤثر أعراض القلق والاكتئاب سلبًا على درجة تقبل المرض وتقلل بشكل ملحوظ من جودة الحياة لدى المرضى المصابين بالسكري. كما يعد تراجُع جودة الحياة مؤشراً هاماً لسوء تقبل المرضى للمرض.

Objectives: To determine the occurrence of symptoms of anxiety and depression in patients with type 2 diabetes, as well as to assess the relationship between the occurrence of symptoms of anxiety and depression, quality of life, and level of acceptance of illness of patients in northeastern Poland.

Methods. A cross-sectional study was conducted on 126 patients with type 2 diabetes in the Department of Endocrinology, Diabetes and Internal Diseases, Medical University of Bialystok, Bialystok, Poland from February 2010 to March 2011. Three questionnaires were administered: Hospital Anxiety and Depression Scale, Acceptance of Illness Scale, and SF-36v2 Scale.

Results. Symptoms of anxiety were found in 30.4% of patients and depression in 32%, more often in women than men (20.6% versus 10.3% for anxiety and 22.2% versus 10.3% for depression). Multiple regression analysis revealed that 50% of variance on the illness acceptance scale affected the quality of life in relation to the general health PCS and MCS.

Conclusion. Symptoms of anxiety and depression adversely affect the degree of acceptance of illness and significantly lower the quality of life in patients with diabetes. Lowered quality of life is an important predictor of worse acceptance of illness by patients.

Saudi Med J 2012; Vol. 33 (8): 887-894

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Received 4th April 2012. Accepted 15th July 2012.

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Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

Several factors affect the occurrence of type 2 diabetes mellitus (T2DM), including sedentary lifestyle, obesity, and the aging of society. Depression occurs frequently; the course of depression in patients with both diabetes and depression is chronic and severe.[1] The gold standard for the diagnosis of depression is a structured diagnostic psychiatric interview based on the criteria of the Diagnostic and Statistical Manual of Psychiatric Disorders (DMC). However, it takes a lot of time and therefore questionnaire interviews are often applied as a method of screening for symptoms of depression. Their sensitivity is low, but they provide an idea of the prevalence of depression symptoms.[2] There is increasing evidence pointing to the coexistence of depression in diabetic patients with additional functional, financial, and psychological burdens. It was also shown that patients with diabetes and depression are characterized by worse adherence to diet, exercise, and medication recommendations.[3] The presence of T2DM appears to be associated with emotional problems, which are a major threat to the quality of life in a significant percentage of patients. In addition, emotional problems such as depression and anxiety are associated with poor self care and glycemic control. Patients with T2DM and depression are also at greater risk of occurrence and progression of vascular complications and have higher mortality than patients with T2DM who are not depressed.[4] Coping with the mental toll of diabetes is based on recognition of the sense of helplessness, acceptance of reality, coping with anger, fear and often admitting to frustration. Admitting to a sense of helplessness in relation with diabetes does not mean that the person experiencing it does not have the strength to make changes in his/her life. It rather means accepting that you cannot reverse the consequences of certain life events.[5] Somatic illness has a significant impact on current lifestyle, provides a variety of negative emotions, difficulties, and restrictions caused by the disease.

Type 2 diabetes predisposes to the occurrence of depression and lowers quality of life in relation to general health. The occurrence of depression in patients with diabetes causes additional functional, financial, and psychological burdens and affects worse adherence to diet, exercise, and medication recommendations. This paper shows the results of our study concerning the relationship between the occurrence of symptoms of anxiety and depression, the level of quality of life and the level acceptance of illness by patients with T2DM.

The aim of this study was to determine the occurrence of symptoms of anxiety and depression in patients with T2DM, as well as to assess the relationship between the occurrence of symptoms of anxiety and depression, quality of life and level of acceptance of illness by the patient.

Methods. The study was conducted in 126 patients with T2DM in the Department of Endocrinology, Diabetes and Internal Diseases, Medical University of Bialystok, Bialystok, Poland from February 2010 to March 2011. The study inclusion criteria were: (i) type 2 diabetes, (ii) the ability to write, read, speak, (iii) orientation as to time, place, person, (iv) serious diseases such as apoplexy; cancer were excluded.

A cross-sectional design was employed for this study. This was a random sample of patients with a diagnosis of T2DM. All subjects were informed about the purpose of the study and agreed to participate in the survey. All subjects volunteered to participate. Patients filled out a questionnaire containing: personal information, Hospital Anxiety and Depression Scale (HADS), Acceptance of Illness Scale (AIS), and SF-36v2 scale. Personal information included demographic characteristics (age, gender, marital status, education) and history of the disease (diagnosis, history of diabetes in family, duration of illness, treatment, complications, co-morbidities).

The level of anxiety was assessed using the HADS, which was developed in 1983 by R. Snaith and A. Zigmond[6] as a screening tool for mood disorders in the population of persons with somatic diseases. The questionnaire consists of 2 independent subscales: depression (HADS-D) and anxiety (HADS-A), each of which contains 7 statements. Every statement is awarded from 0 which stands for lack of anxiety or depression to 3 points, which represents feeling anxious or depressed: the maximum number of points on the subscale is 21. The anxiety subscale includes questions about restless mood, anxiety, fear thoughts or panic attacks. The depression subscale focuses on loss of interest and lowered ability to experience pleasure. In interpreting the results, it was assumed that 8-10 points mean that the existence of depressive and/or anxiety disorders is suspected, 11 and more points mean that there is a possibility of a depressive and/or anxiety disorder. The higher the score, the greater the severity of the disorder: 11-14 points = moderate, 15-21 points = significant intensity. Hospital Anxiety and Depression Scale is considered reliable in many studies of the value of Cronbach's alfa for the HADS-A subscale from 0.68-0.93 and for the HADS-D subscale from 0.67 to 0.90.[6,7] Hospital Anxiety and Depression Scale is not a diagnostic tool; it can be a useful screening device for identifying those individuals in need of psychological care or treatment prior to their consultation.[7] Acceptance of the disease was examined

using the Acceptance of Illness Scale (AIS), which was constructed by Felton, Revenson, Hinrichsen in 1984 from the Center for Community Research and Action, New York University. The reliability of the Polish version of the scale, adopted by Juczyński,[8] is similar to the original version, for which Cronbach's alfa is 0.82, while the rate of test-retest stability over 7 months is 0.69. It consists of 8 statements describing the consequences of ill health resulting in recognition of the constraints imposed by the disease, lack of self-sufficiency, a sense of dependence on other people and low self-esteem. The tool is used to measure the level of illness acceptance; greater illness acceptance means better adjustment and less psychological discomfort. The AIS can be applied to assess the level of acceptance of any disease.[8]

The quality of life (HRQoL) was measured using the Polish version of the SF-36v2 scale, consisting of 8 subscales assessing the following dimensions of quality of life: physical functioning, social functioning, limitation of fulfilling social roles due to physical causes, limitation of fulfilling social roles due to mental causes, bodily pain, general health, vitality, and mental health. The construction of the SF-36v2 allows isolating the calculation of aggregate results in 2 dimensions: physical functioning (physical component summary [PCS]) and mental functioning (mental component summary [MSC]). The scale has good psychometric characteristics.[6]

Ethical consent. The research protocol and the questionnaires was conducted according to the principles of the Declaration of Helsinki as well as reviewed and approved by the Bioethics Committee of the Medical University of Bialystok (RI-002/115/2009).

Statistical analysis. Data analysis was performed using the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 17.0 for Windows. Spearman's rank correlation coefficient was used to determine the correlation between the results of the questionnaire surveys: HADS, SF-36v2, and AIS. The non-parametric Chi-square test of significance was used to identify statistical dependencies between groups of patients with or without symptoms of anxiety and depression and selected personal characteristics and clinical data (**Tables 1 & 2**). The non-parametric Mann-Whitney test was used to identify statistical dependencies between groups of patients with or without symptoms of anxiety and depression and selected data such as age, diabetes duration, body mass index, hemoglobin A1c test as well as the SF-36v2, and AIS questionnaire survey results. The Bonferonni corrections for multiple comparisons was used.[9] Linear multiple regression analysis was used to identify predictors influencing the degree of acceptance of the illness.

In the presented study, the patients were divided into 2 groups. The first group consisted of persons who received 0-7 points on the scale of depression/and anxiety, who qualified as persons without symptoms of depression or anxiety. The second consisted of persons with scores of 8-21 with moderate to severe symptoms of depression or anxiety.

Results. Tables 1 & 2 presents the personal characteristics, clinical history, and psychological characteristics of the respondents. In the research group of patients with T2DM, there were 74 women and 52 men, the mean age for men was 58.8 ± 10.1 years and 66.5 ± 9.5 years for women. Symptoms of

Table 1 - Personal characteristics of patients with and without symptoms of depression or anxiety (N=126).

Variables	HADS Anxiety			HADS depression		
	<0-7 (n=87)	≥8-21 (n=39)	*P*-value	<0-7 (n=85)	≥8-21 (n=41)	*P*-value
Gender			0.009			0.13
Female	48 (38.1)	26 (20.6)		46 (36.5)	28 (22.2)	
Male	39 (31.0)	13 (10.3)		39 (31.0)	13 (10.3)	
Age	63.7±14.6	62.3±12.1	0.80	61.6±10.8	66.9±8.5	0.006
Marital status			0.86			0.97
Married/ in a relationship	59 (46.8)	26 (20.6)		58 (46.0)	27 (21.4)	
Single	7 (5.6)	3 (2.4)		9 (7.2)	1 (0.8)	
Widow/widower	21 (16.7)	10 (7.9)		18 (14.2)	13 (10.3)	
Education			0.51			0.08
Junior high school	24 (19.1)	9 (7.2)		18 (14.3)	15 (11.9)	
Vocational	20 (15.9)	18 (14.3)		25 (19.8)	10 (7.9)	
High school	26 (20.6)	9 (7.2)		26 (20.6)	12 (9.5)	
College	17 (13.5)	3 (2.4)		16 (12.7)	4 (3.2)	

Data are presented as number and percentage (%) or mean±SD, HADS - hospital anxiety and depression scale, HbA1c - c-fraction of glycosylated hemoglobin, BMI - body mass index; in the statistical analysis, the Chi-square test were used.

Table 2 - Medical history of patients with and without symptoms of depression or anxiety (N=126).

Variables	HADS anxiety			HADS depression		
	<0-7 (n=87)	≥8-21 (n=39)	*P*-value	<0-7 (n=85)	≥8-21 (n=41)	P-value
Duration of illness	12.5±8.7	12.5±8.2	0.83	12.1±8.8	13.4±8.1	0.32
History of diabetes in family			0.97			0.008
Yes	36 (28.6)	16 (12.7)		42(33.4)	10(7.9)	
No	51 (40.5)	23 (18.2)		43(34.1)	31(24.6)	
Body mass index	30.8±5.6	31.7±5.6	0.44	30.8±5.5	31.8±5.8	0.29
Insulin			0.65			0.12
Positive	66 (52.4)	31 (24.6)		62(49.2)	35(27.8)	
Negative	21 (16.7)	8 (6.3)		23(18.3)	6(4.8)	
HbA1C	8.5±1.6	8.5±1.7	0.82	8.5±1.6	8.5±1.8	0.73
Hypertension			0.09			0.11
Yes	68 (54.0)	25 (19.8)		59(46.8)	34(27.0)	
No	19 (15.1)	14 (11.1)		26(20.6)	7(5.6)	
Neuropathy			0.58			0.57
Yes	40 (31.7)	20 (15.9)		39(30.9)	21(16.7)	
No	47 (37.3)	19 (15.1)		46(36.5)	20(15.9)	
Nephropathy			0.49			0.68
Yes	21 (16.7)	7 (5.6)		20(15.9)	8(6.3)	
No	66 (52.3)	32 (25.4)		65(51.6)	33(26.2)	
Retinopathy			0.71			0.37
Yes	14 (11.1)	7 (5.6)		16(12.7)	5(3.9)	
No	73 (57.9)	32 (25.4)		69(54.8)	36(28.6)	

The values in the table are presented as number and percentage (%) or mean±SD, HADS - Hospital Anxiety and Depression Scale, HbA1c - c-fraction of glycosylated hemoglobin, Mann-Whitney test and the Chi-squate test were used.

anxiety were found in 39 (30.4%) and depression in 41 (32%) of patients, who were more often in women than men (20.6% versus 10.3% for anxiety and 22.2% versus 10.3% for depression), these differences were not statistically significant. A correlation between age and the occurrence of depression was found while analyzing several clinical and socio-demographic variables. Patients with symptoms of depression were statistically significantly older (66.9±8.5, p=0.006). Another variable that significantly influences the incidence of depression is confirmed diabetes among relatives (p=0.008), close (mother, father, siblings) and distant (uncle, aunt, grandmother, grandfather). No statistically significant differences were observed in the conducted study between depression and anxiety and other analyzed variables such as marital status, education, disease duration, body mass index, insulin treatment, HbA1c levels, hypertension and complications of the illness in the form of neuropathy, nephropathy, and retinopathy. Analysis of the survey results using Spearman's rank correlation coefficient was the next step in the study. Statistically significant correlations were found between the variables, that is quality of life in relation to general health SF-36v2, anxiety and depression (HADS) and the level of acceptance of illness by the patient (AIS), (**Table 3**). Symptoms of anxiety (p=0.000) and depression (p=0.000) negatively correlated with acceptance of their illness and quality of life (PCS, p=0.001 and MCS, p=0.000). However, subscales of quality of life in relation to general health (PCS, p=0.000 and MCS, p=0.000) correlated positively with the acceptance of illness scale, which means that the higher the score, indicating better quality of life, the better the acceptance of diabetes in the group of studied patients.

Table 4 presents the results concerning the impact of symptoms of anxiety and depression on the degree of acceptance of illness and quality of life using the Mann-Whitney test. Due to numerous comparisons, the Bonferroni correction was applied, after which the level of significance was p=0.005; therefore, significance above this value is not statistically significant. It was noted that the prevalence of anxiety and depression in patients with T2DM statistically significantly reduces acceptance of the illness (anxiety p=0.004; depression, p=0.000) and quality of life in the PCS (depression, p=0.000) and mental - MCS (anxiety p=0.000; depression, p=0.000). Information on physical functioning, physical role functioning, bodily pain, and general health is combined into PCS, information on vitality, social functioning, emotional role functioning and mental health is combined into MCS. Among patients with symptoms of anxiety and quality of

Table 3 - Spearman's correlation coefficient* between acceptance of illness scale (AIS), quality of life (SF-36v2), and anxiety and depression (HADS).

Scales	1	2	3	4	5
1- AIS					
2 - HADS D	-0.522* *p*=0.000				
3 - HADS A	-0.414* *p*=0.000	0.690* *p*=0.000			
4 - PCS	0.637* *p*=0.000	-0.473* *p*=0.000	-0.306* *p*=0.001		
5 - MCS	0.511* *p*=0.000	-0.690* *p*=0.000	-0.582* *p*=0.000	0.295* *p*=0.001	

Table 5 - Hierarchical multiple regression of quality of life on the acceptance of illness scale (AIS) (N=126).

AIS	Model 1		Model 2	
	t	*P*-value	t	*P*-value
PCS	9.00	0.000	8.25	0.000
ß	0.63		0.55	
95% CI	(0.48-0.76)		(0.40-0.67)	
MCS			4.97	0.000
ß			0.33	
95% CI			(0.22-0.48)	
R^2	0.39		0.50	
R^2 change	0.39		0.11	

PCS - Physical component summary, MCS - mental component summary.

Table 4 - Impact of symptoms of anxiety and depression (HADS) on quality of life (SF-36) and the level of illness acceptance (AIS).

Variables	HADS anxiety			HADS depression		
	<0-7 (n=87)	≥8-21 (n=39)	*P*-value	<0-7 (n=85)	≥8-21 (n=41)	*P*-value
Acceptance of illness scale			0.004			0.000
Mean±SD	29.5±7.9	24.7±8.5		30.2±7.9	23.4±7.5	
95% confidence interval	(27.8-31.2)	(21.6-27.1)		(28.4-31.9)	(21.1-25.8)	
Short form-36v2						
Physical functioning			0.056			0.000
Mean±SD	39.7±12.9	34.9±13.9		41.3±12.8	31.9±12.4	
95% confidence interval	(36.8-42.4)	(30.9-39.8)		(38.4-43.9)	(28.5-36.5)	
Physical role functioning			0.012			0.000
Mean±SD	38.6±13.0	32.0±13.0		39.9±12.7	29.5±11.7	
95% confidence interval	(35.7-41.3)	(27.2-35.5)		(37.0-42.5)	(26.3-33.9)	
Bodily pain			0.008			0.030
Mean±SD	48.2±13.9	40.7±15.1		47.9±14.2	41.7±14.9	
95% confidence interval	(45.1-51.2)	(35.2-45.0)		(44.7-50.9)	(37.4-46.9)	
General health			0.000			0.000
Mean±SD	35.9±10.7	26.9±8.7		36.6±10.4	25.9±8.2	
95% confidence interval	(33.6-38-2)	(23.9-29.8)		(34.5-40.1)	(23.5-28.9)	
Vitality			0.000			0.000
Mean±SD	46.8±9.6	37.6±9.4		47.7±9.7	36.1±7.1	
95% confidence interval	(44.7-48.8)	(34.3-40.6)		(45.6-49.9)	(34.4-39.9)	
Social functioning			0.004			0.000
Mean±SD	41.5±13.6	33.3±14.6		42.6±13.1	31.3±13.9	
95% confidence interval	(38.4-44.2)	(30.1-36.8)		(39.6-45.3)	(26.9-35.7)	
Emotional role functioning			0.000			0.000
Mean±SD	39.1±13.7	33.3±13.6		41.3±13.0	29.0±11.9	
95% confidence interval	(36.8-42.1)	(30.2-36.5)		(38.6-44.1)	(26.1-34.1)	
Mental health			0.000			0.000
Mean±SD	41.5±10.0	31.6±10.0		42.2±9.5	30.6±9.8	
95% confidence interval	(39.2-43.6)	(28.1-34.8)		(40.2-44.4)	(27.7-33.8)	
Physical component summary			0.009			0.000
Mean±SD	41.5±10.6	35.6±12.8		42.1±10.6	34.4±11.9	
95% confidence interval	(39.1-43.6)	(30.9-39.2)		(39.7-44.3)	(31.1-38.7)	
Mental component summary			0.000			0.000
Mean±SD	42.3±10.5	33.4±9.8		43.6±9.9	31.1±8.1	
95% confidence interval	(39.9-44.4)	(29.9-36.4)		(41.5-45.8)	(28.9-33.9)	

The Mann-Whitney test was used in the statistical analysis; due to numerous comparisons the Bonferroni correction was applied, after which the level of significance is *p*=0.005, therefore the significance given above was not statistically significant. HADS -

life was statistically significantly lower in the general health subscale, vitality, social functioning, emotional role functioning, and mental health. In the group of patients with symptoms of depression, quality of life was significantly worse in the following subscales: physical functioning, physical role functioning, general health, vitality, social functioning, emotional role functioning, and mental health.

For further statistical analysis of the obtained data, we made an attempt to answer the question: Which variables affect the degree of illness acceptance in the group of studied patients with T2DM? Multiple regression analysis (**Table 5**) revealed that 50% of variance on the AIS affected the quality of life in relation to the general health PCS and MCS. In model 1, the quality of life in the PCS represented as much as 39% of the variance (R2=0.39, 95% CI, 0.35-0.49). The inclusion of the second dimension of mental quality of life (MCS), model 2, resulted in an increase of 11% of the variance affect on the illness acceptance scale (R2=0.11, 95% CI, 0.10-0.36). The full model accounts for 50% of the variance on the illness acceptance scale (R2=0.50, F=60.7 (df=123), p=0.000).

Discussion. In the conducted survey, anxiety symptoms were found in 39 (30.4%) patients and depression in 41 (32%). As proved in studies by Mezuk et al,[10] the combined relative risk (RR) of incidence of depression associated with the treatment of diabetes was 1.15 (95% CI 1.02-1.30), while the occurrence of incidence of diabetes in patients with depression was 1.60 (95% CI 1.37-1.88). The Polish authors, Kokoszka et al,[11] found that emotional problems associated with diabetes in Poland are common among patients with T2DM and coexisting depression, and to a lesser extent in patients with subclinical depression, compared with T2DM not suffering from depression. There is no information which would concern the right approach and treatment of patients with type 1 and 2 diabetes who in fact do not suffer from clinical depression; however, frequently or occasionally experience feelings very close to it connected with the necessity of living with their disease. This condition is sometimes referred to as distress associated with diabetes. It is similar to depression, but not acute enough that it can be diagnosed as depression.[5] Lloyd et al[12] present the HADS scale as an appropriate tool for conducting clinical research in adult patients with diabetes; the HADS scale allows to demonstrate a strong association between glycemic control and the occurrence of anxiety and depression mainly among men. A relationship was noted between gender and glycemic control (HbA1c) and the occurrence of depression and anxiety. Sotiropoulos et al[13] also show that more symptoms of depression occurred in women than men (48.4% versus 12.7%; p<0.001). In our study, patients with symptoms of depression were significantly statistically older compared to patients without depressive symptoms (66.9±8.5 versus 61.6±10.8; p=0.006). However, in other studies, no significant association between age and depression or anxiety occurrence in patients with T2DM was observed.[12] However, Al-Maskari et al[14] believed that the patients who are less under the age of 40 years old have better quality of life compared with other age groups.

Data show that confirmed diabetes among relatives predisposes to the occurrence of depressive symptoms, these differences are statistically significant (p=0.008). However, there was no significant association between the occurrence of anxiety and depression and such socio-demographic variables: marital status, level of education, or clinical: duration of disease, BMI, HbA1c, type of treatment. Hypertension, neuropathy, retinopathy, nephropathy also had no significant association with the occurrence of anxiety or depression. Although the studies of Yoshida et al[15] show that among patients with diabetes who suffer from depression, neuropathy, retinopathy, pain, worse general health and lack of social support occur more often than in patients with diabetes without depression. However, there was also no significant association between age, gender, marital status, insulin therapy, illness duration and HbA1c levels between patients with depression and without depression.

In our study, we observed that the prevalence of anxiety and depression in patients with T2DM statistically significantly reduces acceptance of illness and quality of life in relation to general health. Symptoms of depression significantly lowered PCS and MCS.[16] Disruption of quality of life of patients and at the same time emotional problems associated with diabetes were found to be associated with chronic occurrence of symptoms of depression.[17] Rose et al[18] believe that if a patient reports a good, optimistic outlook on life and firmly believes in self-efficacy, he/she is more likely to posses a higher quality of life, even in the presence of comorbidities. Wexler et al[19] compared the magnitude of the effect of depressive symptoms on quality of life and showed that depression was more strongly related to generic quality of life than microvascular complications, heart failure and the number of medications used. Treatment of depression and prevention of complications have the greatest potential to improve health-related quality of life

in T2DM. Diabetic patients with depressive symptoms had significantly lower quality of life compared to patients with diabetes without depression. Therefore, increased awareness and monitoring for depression are needed in different areas of diabetes care.[2] The studies of Eren et al[20] showed that the presence of depression in patients with T2DM worsens the quality of life of patients and treatment of depression would have a positive impact on quality of life. In our study multiple regression analysis revealed that 50% of variance on the illness acceptance scale (AIS) affected the quality of life in relation to the general health, PCS and MCS. Patients characterized by a strong belief in self-efficacy and an optimistic outlook on life were more satisfied with their doctor-patient relationship. They showed more active behavior of coping with stress and had higher quality of life. Belief in self-efficacy and active coping behaviors appear to be the most important for the realization of basic objectives of treatment.[18] The study results indicate that health care providers should pay more attention to non-clinical factors such as coping styles and social support, taking into account diabetes-related distress. They should also be aware that interventions based on the psychosocial approach may primary effect distress, and not necessarily metabolic control and may improve the effects of patient education and disease self-management.[21] Open communication between the patient and the care giver can lead to valuable improvements in treatment.[22] Other studies argue that diabetes-related distress had a significant impact on patient satisfaction and quality of life.[23]

The limitations of this study include the fact that the study sample was recruited from only one hospital suggesting that the results may not be applicable to all patients with type 2 diabetes in northeastern Poland.

Treatment of depression through cognitive behavioral therapy (CBT) and antidepressant pharmacotherapy will improve glycemic control, as well as patient functioning and quality of life. Activities conducted to improve, quality of life should include psycho-educational programs. By improving quality of life, the patient will be able to accept reality, better deal with anger, fear and frustration associated with such a chronic disease as diabetes.

In conclusions, symptoms of anxiety and depression adversely affect the degree of acceptance of illness and significantly lower the quality of life in patients with diabetes. Lowered quality of life is an important predictor of worse acceptance of illness by patients.

Acknowledgment. *The authors gratefully acknowledge Urszula Humienik-Dworakowska for the translation of the manuscript.*

References

1. Katon WJ. The comorbidity of diabetes mellitus and depression. ***Am J Med*** 2008; 121 (11 Suppl 2): S8-S15.
2. Schram MT, Baan CA, Pouwer F. Depression and quality of life in patients with diabetes: a systematic review from the European depression in diabetes (EDID) research consortium. ***Curr Diabetes Rev*** 2009; 5: 112-119.
3. Egede LE, Ellis C, Grubaugh AL. The effect of depression on self-care behaviors and quality of care in a national sample of adults with diabetes. ***Gen Hosp Psychiatry*** 2009; 31: 422-427.
4. Pouwer F. Should we screen for emotional distress in type 2 diabetes mellitus? ***Nat Rev Endocrinol*** 2009; 5: 665-671.
5. Solowiejczyk J. Diabetes and Depression: Some thoughts to think about. ***Diabetes Spectrum*** 2010; 21: 11-15.
6. Bowling A. Measuring disease. A review of quality of life measurement scales. Berkshire: Open University Press; 2005.
7. Bjelland I, Dahl A, Haung T, Neckelmann D. The validity of the Hospital Anexiety and Depression Scale. A updated literature review. ***J Psychosom Res*** 2002; 52: 69-77.
8. Juczyński Z. Measurement tools in health promotion and health psychology. Warszawa (PL): Pracownia Testów Psychologicznych Polskiego Towarzystwa Psychologicznego; 2001. [Polish]
9. Abdi H. Bonferroni and Šidák corrections for multiple comparisons. (ed. N.J. Salkind) Encyclopedia of Measurement and Statistics. Thousand Oaks, CA: Sage 2007.
10. Mezuk B, Eaton WW, Albrecht S, Golden SH. Depression and type 2 diabetes over the lifespan: a meta-analysis. ***Diabetes Care*** 2008; 31: 2383-2390.
11. Kokoszka A, Pouwer F, Jodko A, Radzio R, Mućko P, Bieńkowska J, et al. Serious diabetes-specific emotional problems in patients with type 2 diabetes who have different levels of comorbid depression: a Polish study from the European Depression in Diabetes (EDID) Research Consortium. ***Eur Psychiatry*** 2009; 24: 425-430.
12. Lloyd CE, Dyer PH, Barnrtt AH. Prevalence of symptoms of depression and anxiety in a diabetes clinic population. ***Diabetic Medicine*** 2000; 17: 198-202.
13. Sotiropoulos A, Papazafiropoulou A, Apostolou O, Kokolaki A, Gikas A, Pappas S. Prevalence of depressive symptoms among non insulin treated Greek type 2 diabetic subjects. ***BMC Res Notes*** 2008; 1: 101.
14. Al-Maskari MY, Al-Shookri AO, Al-Adawi SH, Lin KG. Assessment of quality of life in patients with type 2 diabetes mellitus in Oman. ***Saudi Med J*** 2011; 32: 1285-1290.
15. Yoshida S, Hirai M, Suzuki S, Awata S, Oka Y. Neuropathy is associated with depression independently of health-related quality of life in Japanese patients with diabetes. ***Psychiatry Clin Neurosci*** 2009; 63: 65-72.
16. Sundaram M, Kavookjian J, Patrick JH, Miller LA, Madhavan SS, Scott VG. Quality of life, health status and clinical outcomes in Type 2 diabetes patients. ***Qual Life Res*** 2007; 16: 165-177.
17. Pibernik-Okanovic M, Begic D, Peros K, Szabo S, Metelko Z; European Depression in Diabetes Research Consortium. Psychosocial factors contributing to persistent depressive symptoms in type 2 diabetic patients: a Croatian survey from the European Depression in Diabetes Research Consortium. ***J Diabetes Complications*** 2008; 22: 246-253.

18. Rose M, Fliege H, Hildebrandt M, Schirop T, Klapp BF. The network of psychological variables in patients with diabetes and their importance for quality of life and metabolic control. ***Diabetes Care*** 2002; 25: 35-42.
19. Wexler DJ, Grant RW, Wittenberg E, Bosch JL, Cagliero E, Delahanty L, Blais MA, Meigs JB. Correlates of health-related quality of life in type 2 diabetes. ***Diabetologia*** 2006; 49: 1489-1497.
20. Eren I, Erdi O, Sahin M. The effect of depression on quality of life of patients with type II diabetes mellitus. ***Depress Anxiety*** 2008; 25: 98-106.
21. Wu SF, Huang YC, Liang SY, Wang TJ, Lee MC, Tung HH. Relationships among depression, anxiety, self-care behaviour and diabetes education difficulties in patients with type-2 diabetes: a cross-sectional questionnaire survey. ***Int J Nurs Stud*** 2011; 48: 1376-1383.
22. Prins MA, Verhaak PF, Bensing JM, van der Meer K. Health beliefs and perceived need for mental health care of anxiety and depression--the patients' perspective explored. ***Clin Psychol Rev*** 2008; 28: 1038-1058.
23. Wang RH, Wu LC, Hsu HY. A path model of health-related quality of life in type 2 diabetic patients: a cross-sectional study in Taiwan. ***J Adv Nurs*** 2011; 67: 2658-2667.

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