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Original Research Article

Assessment of Depression and Anxiety Levels among Type 2 Diabetes Mellitus Patients and Healthy Individuals: A Cross Sectional Observational Study

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Abstract

Introduction: Diabetes is a chronic disorder which is characterised by rise in blood glucose level. Diabetes is a stressful condition, which may lead to anxiety and depression, if not managed properly. These negative emotions may cause worsening of diabetes. Hence, the present study aimed to determine Depression and Anxiety Levels in Type 2 Diabetes Mellitus patients and compare that level with healthy individuals, by using DASS - 42 (Depression Anxiety Stress Scale).

Aim and Objective: The present study was aimed towards assessing and comparing Depression and Anxiety levels among Type 2 Diabetes Mellitus patients and matched healthy controls.

Materials and Methods: The present study was a cross sectional comparative type of observational study conducted in the Upgraded Department of Physiology, S.M.S. Medical College and Attached Hospitals, Jaipur, Rajasthan, India, on 40 type 2 diabetic patients aged 40-70 years. An equal number of age and gender-matched healthy participants were recruited as controls. Before commencing the study, ethical clearance was obtained from the Institutional Research Review Board and Ethics Committee of the Institution and written informed consent was obtained from all the participants. DASS - 42 scale was used to assess the Depression and Anxiety levels. "Unpaired t-test " was used to find the significance of difference between the two groups, using Statistical Package for the Social Sciences (SPSS) version 20.0. Statistical significance was designated at p – value of less than 0.05.

Results: In present study, mean and standard deviation values of depression score for cases were 13.98 ± 9.80 and that of control were 8.4 ± 7.49. Mean and standard deviation values of anxiety score for cases were 16.28 ± 9.70 and that of control were 8.53 ± 7.19. The values were found to be significantly higher in type 2 diabetes mellitus cases as compared to healthy controls (p-value < 0.05).

Conclusion: The present study concludes that there are significantly higher depression and anxiety levels in type 2 diabetes mellitus cases as compared to healthy controls. So, psychiatric interventions support in the management plan of diabetes are required for avoiding the further complication and better management of diabetes mellitus.

Keywords: Type 2 Diabetes Mellitus, DASS-42, Depression, Anxiety

Introduction

Diabetes is a chronic disorder which is characterised by increase in blood glucose level. In the 21st century, diabetes is considered as one of the largest global health emergencies, that has reached alarming levels. The number of people suffering from this condition are increasing every year. India has 69.2 million people with diabetes and estimation is that as per projections, 123.5 million persons will have diabetes by 2040.[1]

Diabetes Mellitus is broadly classified into three main categories: - Type 1 Diabetes Mellitus, Type 2 Diabetes Mellitus and Gestational Diabetes Mellitus. Type 1 Diabetes Mellitus occurs due to complete or near total insulin deficiency. Type 2 Diabetes Mellitus occurs due to insulin resistance, the cells do not respond appropriately to insulin. So, blood glucose does not enter into these cells and as a result, there is high glucose level in blood. Gestational Diabetes Mellitus occurs during pregnancy.

Type 2 Diabetes Mellitus (T 2 DM) has increased in recent few years and has become a common condition due to rapid social, cultural and lifestyle changes. There is increased urbanisation, aging of the populations, physical activity has been reduced, increased intake of packaged food, increased sugar consumption, low intake of fruits and vegetables.[2]

In diabetic patients, the prevalence of depression and anxiety symptoms are about two to four times greater than in the general population.[3] Depression is marked by sad mood, loss of interest, decreased self-esteem, loss of sleep, appetite loss, feelings of tiredness, and impaired concentration.[4] Anxiety is characterized by feeling of apprehension, and nervousness.[5] In 2001, Anderson *et al*; found that the patients having higher depression level show less response to the treatment of diabetes.[6] Ungoverned level of glucose in the long run can escalate the prospect of diabetic complications, few of these includes- Renal, Ocular, Cardiovascular, Pregnancy related ailments, infections, neuronal devastation etc.[6]

In the present study, for assessment of Depression and Anxiety level DASS-42 scale was used. The DASS (Depression Anxiety Stress Scale) is a 42-item questionnaire developed by Lovibond, which measures the magnitude of three emotional states: depression, anxiety, and stress. DASS is widely used in both clinical as well as non - clinical samples and there is excellent reliability and validity. The tool of DASS has been translated in different languages.[7]

The paramount intent in the diabetes care is to sustain metabolic control at competent level to minimise detrimental effect of diabetes and at last improving quality of life. To prevent or delay the metabolic complications, indispensable component is to sustain the blood glucose level close to normal range.[8]

As self-care management has got a major role in diabetes management, so comorbid anxiety and depression in diabetic patients may lead to poor outcomes and increased risk of complications; as there is decreased adherence to glucose monitoring, regular exercise, following proper diet and medication.[9] The study commenced with a hypothesis that these negative emotions may adversely affect the control of diabetes. The

primary focus of the study was to determine Depression and Anxiety Levels in Type 2 Diabetes Mellitus patients and compare that level with healthy individuals, by using DASS 42 scale.

Materials and Methods

The present cross sectional, comparative type of observational study was conducted in the Upgraded Department of Physiology of S.M.S. Medical College and Attached Hospitals, Jaipur, Rajasthan, India, after obtaining the desired clearance from Institutional Research Review Board and Ethics Committee of the Institution and written informed consent was obtained from all the participants, after explaining the purpose and procedure of the test, prior to commencement of the study.

Inclusion criteria: The study enrolled 40 already diagnosed patients of Type 2 Diabetes Mellitus, aged between 40-70 years as cases from the OPD of Medicine and Endocrinology Department of SMS medical college and attached hospitals, Jaipur. An equal number of age and gender-matched healthy participants were recruited as controls.

Exclusion criteria: Subjects having history of hypertension, suffering from serious diabetic complication, history of taking any drugs known to affect mood and subjects who were not cooperative, were excluded from the study.

Sample size: A sample of 40 cases in each group were adequate at 95 % confidence interval and 80 % power to verify expected difference of 10 in mean and SD 4 for DASS score in between two study group (Group 1: Type 2 Diabetes Mellitus Patients and Group 2: Healthy individuals) as found in reference study.[10]

After obtaining baseline information, both these cases as well as controls were assessed for Depression and Anxiety levels, by using Depression, Anxiety, Stress Scale- 42 (DASS - 42). The DASS Depression emphasis on reports of low mood, motivation and self-esteem. DASS-anxiety emphasises on physiological arousal, perceived panic, and fear.[11] depression [question no. 3, 5, 10, 13, 16, 17, 21, 24, 26, 31, 34, 37, 38, 42], anxiety [question no. 2, 4, 7, 9, 15, 19, 20, 23, 25, 28, 30, 36, 40, 41], Hindi version of DASS-42 questionnaire was used for better understanding by local people. A respondent indicates on a 4-point scale, the extent to which each of 42 statements applied to him or her. The 4- point scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). Increasing severity of depression, anxiety was shown by higher scores on each subscale. Total scores for each subscale were calculated with the help of a printed overlay. Increasing severity of depression, anxiety, or stress were indicated by higher scores on each subscale.

	Depression	**Anxiety**
Normal	0-9	0-7
Mild	10-13	8-9
Moderate	14-20	10-14
Severe	21-27	15-19
Extremely severe	28+	20+

{Lovibond, S.H. & Lovibond, P.F. (1995). Manual for the Depression Anxiety Stress Scales (2nd.Ed.). Sydney: Psychology Foundation}

Statistical Analysis

The data were entered into Microsoft Excel spreadsheet. Analysis of data were done using SPSS 20.0 version. The categorical variables were expressed as frequency and percentage and data on Depression and Anxiety scores were expressed as Mean ± SD. To observe the significance of difference between the groups, "unpaired t-test " was used. Statistical significance was designated at p – value of less than 0.05.

Results

Age group of Type 2 Diabetes Mellitus patients and healthy control subjects showed no significant difference [Table 1]. However, significant difference was found in Depression score among cases and controls [Table 2, Figure 1]. 37.5 % of diabetes patients having no depression, 17.5 % having mild depression, 17.5% having moderate depression, 15% having severe depression and 12.5% having extremely severe depression [Table 3]. The difference in Mean ± SD of Anxiety score of Type 2 Diabetes Mellitus patients and healthy control subjects were also statistically significant [Table 4, Figure 2]. As shown in table 5, 25 % of diabetes patients having no anxiety, 0% having mild anxiety, 17.5% having moderate anxiety, 27.5% having severe anxiety and 30% having extremely severe anxiety.

Table 1: Comparison of Mean and Standard Deviation of Age (years) among study groups

Group	N	Mean ± SD	p – value
Cases	40	56.80 ± 8.23	0.195
Controls	40	54.33 ± 8.71	

Table 2: Comparison of Depression score among study groups

Group	N	Mean ± SD	p – value
Cases	40	13.98 ± 9.80	0.005*
Controls	40	8.4 ± 7.49	

*Significant

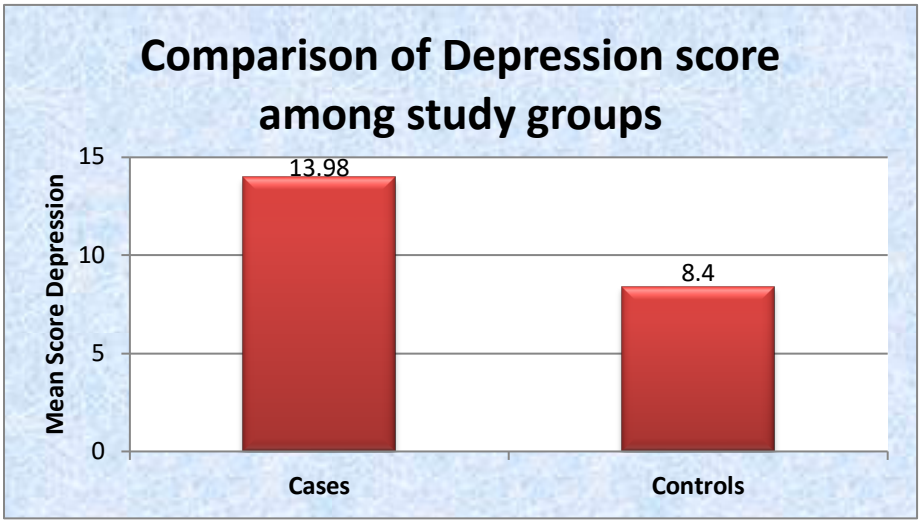

Figure 1: Bar diagram showing Mean values of Depression score among cases and controls.

Table 3: Comparison of depression severity among study groups

Depression Severity	Cases		Controls		Total	
	N	%	N	%	N	%
Normal	15	37.5	29	72.5	44	55
Mild	7	17.5	4	10	11	13.75
Moderate	7	17.5	3	7.5	10	12.5
Severe	6	15	2	5	2	1.25
Extremely severe	5	12.5	2	5	7	8.75
Total	40	100	40	100	80	100

Table 4: Comparison of Anxiety score among study groups

Group	N	Mean ± SD	p – value
Cases	40	16.28 ± 9.70	**<0.001***
Controls	40	8.53 ± 7.19	

*Significant

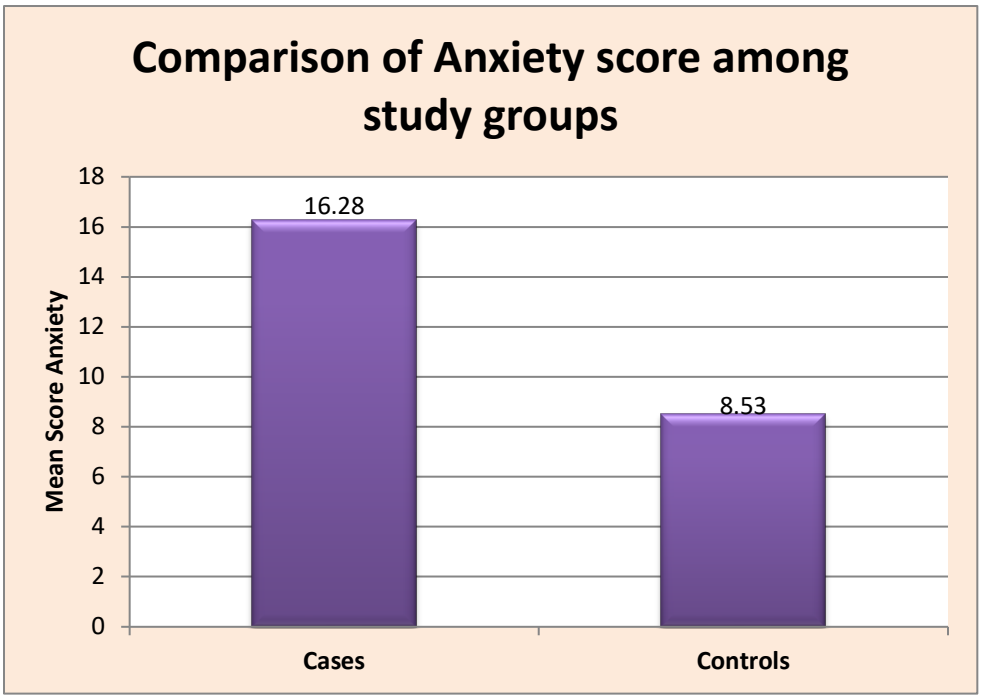

Figure 2: Bar diagram showing Mean values of Anxiety score among cases and controls

Table 5: Comparison of anxiety severity among study groups

Anxiety severity	Cases		Controls		Total	
	N	%	N	%	N	%
Normal	10	25	23	57.5	33	41.3
Mild	0	0	5	12.5	5	6.3
Moderate	7	17.5	4	10	11	13.8
Severe	11	27.5	4	10	15	18.8
Extremely Severe	12	30	4	10	16	20
Total	40	100	40	100	80	100

Discussion

The present study was designed to assess depression and anxiety levels in Type 2 Diabetes Mellitus patients and age and gender matched healthy control subjects. In present study, according to DASS-42 scale, mean and standard deviation values of Depression and Anxiety score exhibited significantly higher values in type 2 diabetes mellitus patients when compared to healthy controls.

A study done by Krishna *et al*.,2018; also found a significant higher values of depression and anxiety levels in type 2 diabetics as compared to healthy controls.[10] On the same line, a study performed by Tan KC *et al*.,2015; demonstrated that higher prevalence of depression and anxiety found in diabetic patients as compared with the general community and also proffered that significant association was seen in depression with marital status and family history of Depression and Anxiety. Anxiety was found to be significantly associated with monthly household income, family history of Depression and Anxiety and presence of co-morbidities.[12]

A study performed by Rajesh Rajput *et al*.,2016; observed that a significant larger proportion of diabetic patients were found to have depression (26.3% vs. 11.2%, P = 0.001), anxiety (27.6% vs. 12.7%, P = 0.001) and comorbid depression and anxiety (21.0% vs. 7.3%, P = 0.001) in comparison with healthy controls. The age, female gender, insulin therapy and diabetic complications like ischemic heart disease, retinopathy and nephropathy were found to be major predictors for a severe form of depression and anxiety among T2DM cases. In their study, diabetic women were found to have significant higher depression scores (17.1% vs. 9.3%) and anxiety scores (17.6 vs. 10.0%) as compared to diabetic men.[13] The possible explanation of higher prevalence of depression and anxiety in female than male could be due to gender-specific matters such as hormonal changes during pregnancy, postpartum period and menstrual cycle, apart from this workload due to duties at house and workplace, care of family members, these all factors could lead to depression and anxiety.[14]

A study by Champaneri *et al*., mainly emphasized on biological basis of depression in adults with diabetes. They showed that in depression, diabetes and diabetes-related risk factors, there were roles of three biological systems namely – Hypothalamic – Pituitary – Adrenal (HPA) axis, Sympathetic Nervous System (SNS) and inflammatory cascade. In both depression and diabetes, there is activation of Hypothalamic – Pituitary – Adrenal (HPA) axis and enhanced level of inflammatory markers.[15]

Pathophysiological association of depression and type 2 diabetes was addressed by Subba *et al*., they proposed that hampered neurotransmitter function (serotonin, dopamine, noradrenaline), impaired neuroplasticity, oxidative stress, inflammation, sleep deprivation, and gut dysbiosis, all these factors contribute to the development of depression and/or type 2 diabetes mellitus.[16]

There is a two - way interaction of depression and diabetes. As shown in previous studies, higher level of depression was found in people with diabetes than normal healthy individual and it has been shown that there was increased risk of type 2 diabetes in people with clinical depression and subclinical depression.[17] A study performed by Gonzalez *et al*., was found that in comparison with other respondents, diabetes patients with major depression showed significantly fewer days of dietary adherence, regular exercise habits and glucose self-monitoring and self-management strategies.[9]

Petrak *et al*., also recommended that those patients who are having a better mood might follow their diabetic treatment better.[18] Depression remains underdiagnosed in diabetic patients, and the awareness of this common co-morbidity would be an important aspect for the diabetic specialist. A multidisciplinary approach would be needed for the diabetic patient to help and improve the outcomes of disease.[19]

In previous studies a higher prevalence of anxiety in type 2 diabetes patients were found as compared to those without type 2 diabetes. [20,21]Fisher *et al*., proposed that diabetes is a chronic medical illness, which is psychologically and behaviourally demanding condition, and nearly at every aspect of diabetes and its treatment psychosocial factors are important.[22] Canadian Diabetes Association, also suggested that routine screening for depression and anxiety among diabetic patients are made mandatory.[23]

Light RW *et al*., and Gerontoukou EI *et al*., proposed a bidirectional association between mood disorders and diabetes and found that the presence of anxiety was known to enhance the risk of developing depression in diabetes patients. [24, 25] Lin *et al*.,2010; monitored diabetic patients for 5 years and stated that a clinically significant risk of macrovascular and microvascular complications was found in diabetics with depression, in comparison to those without depression.[26]

The main purpose of identifying diabetic patients with high risks of depression is to intervene at the earliest by appropriate change in their lifestyle, implement preventive measures and provide cognitive-behavioural treatments. Those preventive measures can lead to a significant decrease in T2DM/depression comorbidity and the cost of treating them, which reduces the burden on the health system.[27] Inadequate metabolic control, reduced adherence to medication, more complication rates, reduced quality of life, and increased risk of death has been observed in co-morbidity of depression with diabetes.[28] To optimize the diabetes management, identification and management of psychiatric disorders are necessary.[29] Hence, a multidisciplinary team is required to manage diabetes mellitus that can manage both physical as well as mental health of patients.

Conclusion

In the present study type 2 diabetes mellitus patients were recruited and were assessed for a possible association of depression and anxiety levels in type 2 diabetes mellitus patients as compared to healthy controls. The results concludes that there are significantly evident depression and anxiety levels in type 2 diabetes mellitus cases and this was in accordance with the findings of several other studies. This highlights the importance of early screening for depression and anxiety for the type-2 diabetes mellitus patients. This is the need of time that psychiatric interventions are required for avoiding the further complication of this disease and to overcome the prevalence of co-morbidity and for better management of diabetes mellitus.

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References

1. International Diabetes Federation. IDF Diabetes Atlas, 7th Edition (2015).
2. WHO Study Group on Prevention of Diabetes Mellitus, editor. Prevention of diabetes mellitus. Geneva: World Health Organization; 1994.
3. Semenkovich K, Brown ME, Svrakic DM, Lustman PJ. Depression in type 2 diabetes mellitus: prevalence, impact, and treatment. Drugs. 2015 Apr; 75(6): 577-87.

4. Kaur G, Tee GH, Ariaratnam S, Krishnapillai AS, China K. Depression, anxiety and stress symptoms among diabetics in Malaysia: a cross sectional study in an urban primary care setting. BMC family practice. 2013 Dec;14(1):1-3.
5. Bener A, OAA Al-Hamaq A, E Dafeeah E. High prevalence of depression, anxiety and stress symptoms among diabetes mellitus patients. The Open Psychiatry Journal. 2011 Dec 9;5(1).
6. Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: a meta-analysis. Diabetes care. 2001 Jun 1;24(6):1069-78.
7. Lovibond 1995, Brown *et al* 1997, Antony *et al* 1998, Clara 2001, Page 2007
8. Hailu E, Mariam WH, Belachew T, Birhanu Z. Self-care practice and glycaemic control amongst adults with diabetes at the Jimma University Specialized Hospital in south-west Ethiopia: A cross-sectional study. African Journal of Primary Health Care and Family Medicine. 2012 Jan 1;4(1):1-6.
9. Gonzalez JS, Safren SA, Cagliero E, Wexler DJ, Delahanty L, Wittenberg E, Blais MA, Meigs JB, Grant RW. Depression, self-care, and medication adherence in type 2 diabetes: relationships across the full range of symptom severity. Diabetes care. 2007 Sep 1;30(9):2222-7.
10. Krishna P. Depression, anxiety, and stress levels in patients with type 2 diabetes mellitus. National Journal of Physiology, Pharmacy and Pharmacology. 2018 Oct 31;8(11):1570-2.
11. Alagiakrishnan K, Sclater A. Psychiatric disorders presenting in the elderly with type 2 diabetes mellitus. The American Journal of Geriatric Psychiatry. 2012 Aug 1;20(8):645-52.
12. Tan KC, Chan GC, Eric H, Maria AI, Norliza MJ, Oun BH, Sheerine MT, Wong SJ, Liew SM. Depression, anxiety and stress among patients with diabetes in primary care: a cross-sectional study. Malaysian family physician: the official journal of the Academy of Family Physicians of Malaysia. 2015;10(2):9.
13. Rajput R, Gehlawat P, Gehlan D, Gupta R, Rajput M. Prevalence and predictors of depression and anxiety in patients of diabetes mellitus in a tertiary care center. Indian journal of endocrinology and metabolism. 2016 Nov;20(6):746.
14. Bener A, OAA Al-Hamaq A, E Dafeeah E. High prevalence of depression, anxiety and stress symptoms among diabetes mellitus patients. The Open Psychiatry Journal. 2011 Dec 9;5(1).
15. Champaneri S, Wand GS, Malhotra SS, Casagrande SS, Golden SH. Biological basis of depression in adults with diabetes. Current diabetes reports. 2010 Dec;10(6):396-405.
16. Subba R, Sandhir R, Singh SP, Mallick BN, Mondal AC. Pathophysiology linking depression and type 2 diabetes: psychotherapy, physical exercise, and fecal microbiome transplantation as damage control. European Journal of Neuroscience. 2021 Apr;53(8):2870-900.
17. Mezuk B, Eaton WW, Albrecht S, Golden SH. Depression and type 2 diabetes over the lifespan: a meta-analysis. Diabetes care. 2008 Dec 1;31(12):2383-90.
18. Petrak F, Baumeister H, Skinner TC, Brown A, Holt RI. Depression and diabetes: treatment and health-care delivery. The Lancet Diabetes & Endocrinology. 2015 Jun 1;3(6):472-85.
19. Bădescu SV, Tătaru C, Kobylinska L, Georgescu EL, Zahiu DM, Zăgrean AM, Zăgrean L. The association between diabetes mellitus and depression. Journal of medicine and life. 2016 Apr;9(2):120.
20. Khuwaja AK, Lalani S, Dhanani R, Azam IS, Rafique G, White F. Anxiety and

depression among outpatients with type 2 diabetes: A multi-centre study of prevalence and associated factors. Diabetology & metabolic syndrome. 2010 Dec;2(1):1-7.
21. Smith KJ, Béland M, Clyde M, Gariépy G, Pagé V, Badawi G, Rabasa-Lhoret R, Schmitz N. Association of diabetes with anxiety: a systematic review and meta-analysis. Journal of psychosomatic research. 2013 Feb 1;74(2):89-99.
22. Fisher EB, Delamater AM, Bertelson AD, Kirkley BG. Psychological factors in diabetes and its treatment. Journal of Consulting and Clinical Psychology. 1982 Dec;50(6):993.
23. Cheng AY. Canadian Diabetes Association 2013 clinical practice guidelines for the prevention and management of diabetes in Canada. Introduction. Canadian journal of diabetes. 2013 Mar 26;37:S1-3.
24. Light RW, Merrill EJ, Despars JA, Gordon GH, Mutalipassi LR. Prevalence of depression and anxiety in patients with COPD: relationship to functional capacity. Chest. 1985 Jan 1;87(1):35-8.
25. Gerontoukou EI, Michaelidoy S, Rekleiti M, Saridi M, Souliotis K. Investigation of anxiety and depression in patients with chronic diseases. Health psychology research. 2015 Sep 30;3(2).
26. Lin EH, Rutter CM, Katon W, Heckbert SR, Ciechanowski P, Oliver MM, Ludman EJ, Young BA, Williams LH, McCulloch DK, Von Korff M. Depression and advanced complications of diabetes: a prospective cohort study. Diabetes care. 2010 Feb 1;33(2):264-9.
27. Pah AM, Bucuras P, Buleu F, Tudor A, Iurciuc S, Velimirovici D, Streian CG, Badalica-Petrescu M, Christodorescu R, Dragan S. The importance of DS-14 and HADS questionnaires in quantifying psychological stress in type 2 diabetes mellitus. Medicina. 2019 Sep 5; 55(9): 569.
28. Egede LE, Ellis C. Diabetes and depression: global perspectives. Diabetes research and clinical practice. 2010 Mar 1;87(3):302-12.
29. Alagiakrishnan K, Sclater A. Psychiatric disorders presenting in the elderly with type 2 diabetes mellitus. The American Journal of Geriatric Psychiatry. 2012 Aug 1;20(8):645-52.