

Prevalence of Anxiety and Depression in Diabetic Patients: A Comparative Study

Alireza Hajseyed Javadi,^{1,*} Amir Ziaee,² Zohre Yazdi,³ Narges Ebrahimabadi,⁴ and Ali Akbar Shafikhani⁵

¹Department of Psychiatry, Qazvin University of Medical Sciences, Qazvin, IR Iran

²Department of Endocrinology, Qazvin University of Medical Sciences, Qazvin, IR Iran

³Department of Occupational Medicine, Qazvin University of Medical Sciences, Qazvin, IR Iran

⁴Department of Medicine, Qazvin University of Medical Sciences, Qazvin, IR Iran

⁵Department of Occupational Health, Qazvin University of Medical Sciences, Qazvin, IR Iran

*Corresponding author: Alireza Hajseyed Javadi, Department of Psychiatry, Qazvin University of Medical Sciences, Qazvin, IR Iran. E-mail: ahsjavadi@qums.ac.ir

Received 2016 August 18; Revised 2016 November 15; Accepted 2017 January 02.

Abstract

Background: Living with diabetes and managing it can have substantial emotional burden on individuals. These changes might affect individuals' lives in terms of stress and depression. The purpose of this study was to determine the prevalence of stress and depression among diabetic women who referred to endocrine clinic of Qazvin in 2014.

Methods: For this purpose, 250 patients (125 individuals suffering from diabetes and 125 individuals as a control group) participated in this study. All individuals completed the beck depression inventory and the cattell anxiety inventory. In addition to these, demographic and clinical records were collected from their medical records and were analyzed by appropriate statistical methods.

Results: In terms of the Maximum of mild anxiety there were 52 diabetic individuals (41.6%) versus 69 individuals of the control group (55.2%); in terms of Moderate-severe anxiety there were 73 cases (58.4%) versus 56 patients (44.8%) (P value = 0.031). In studying the Maximum of mild depression, there were 43 patients (34.4%) versus 92 (73.6%); in terms of Moderate-severe depression, there were 82 patients (65.6%) versus 33 (26.4%) (P value = 0.001). On a closer examination among age, type of diabetes, duration of diabetes, and insulin injections; only the duration of having diabetes was significantly associated with depression as one of the mental health variables.

Conclusions: This study showed that anxiety and depression are significantly more common among diabetic patients in comparison to the control group in the city of Qazvin; therefore, it is necessary to develop primary care by a system based on the reaction, so that an effective treatment for mental health would take place and, ultimately, the impact of these interventions should be studied.

Keywords: Mental Health, Anxiety, Depression, Diabetes

1. Background

Diabetes is a metabolic disorder. In this disease the body's ability to produce insulin is lost or the body becomes resistant to insulin, so the produced insulin cannot perform its normal function (1, 2). According to the statistics provided by the world health organization, 285 million people suffer from diabetes worldwide and this amount will reach 438 million per year by 2030 (3-5). Asian countries bear a large part of diabetes epidemic and among them Iran can also be noted whose prevalence of diabetes is about 9.5% (6). All people with diabetes need regular monitoring of blood glucose levels; this helps them to manage and control diabetes daily (7). Living with chronic conditions such as diabetes, stressful life events, and personality factors may trigger the anxiety; these situations might make it difficult to deal with serious life situations (8). Studies show that symptoms of low blood sugar can sometimes be confused with anxiety which leads to a lack of response to low levels of blood sugar; therefore, study-

ing these subjects and determining the prevalence of these factors is of great importance (9). On the other hand, stressful life events and personality factors trigger depression, which means that diabetes makes depression harder (10). In people with diabetes, depression is associated with high blood sugar levels (11) and reduced levels of self-care (12). Studies show conflicting information about the prevalence of depression in people with diabetes type 1 and 2 (13). It is, therefore, essential that the effect of both factors be considered in studies. In a meta-analysis by Anderson et al. it has been concluded that the prevalence of depression in both types of diabetes is twice as much as that in the individuals without diabetes (14). Depression and anxiety in diabetic patients is common and may affect 10% to 30% of people. Depression in people with diabetes may be associated with a number of potential and demographic factors; of these factors age, the use of insulin, diabetes type, and the duration of diabetes can be noted (15). Depression and anxiety are modifiable risk factors and treatment, then, can improve blood sugar control and health outcomes for

diabetic patients (13). So the aim of this study was to determine the prevalence of anxiety and depression in diabetic patients in comparison to a control group and since depression and anxiety are significantly higher in women than men, this research has been focused on women (16).

2. Methods

This is a descriptive-analytic study that has been conducted on the division of endocrinology at Medical University Hospitals in Qazvin in 2013 to 2014. The Sample size was composed of 250 patients (125 individuals suffering from diabetes and 125 individuals as a control group) that were chosen based on the proportion of cases with an exposure of 50%, confidence level of 95%, and power of 90%. The cases consisted of subjects aged from 20 to 60 years from all patients referring for the treatment of diabetes. The control group was randomly chosen from the nearby clubs, schools, and universities. Controls were apparently healthy and were free from any chronic diseases. This study was conducted in accordance with the priorities of Medical University of Qazvin without any moral problems and it has been approved by the university's ethics committee. Inclusion criteria consisted of signing an informed consent form, suffering from diabetes, full awareness, and the ability to respond to questions. Exclusion criteria were psychological disorders with any medical or psychoanalysis treatments. On the selection day, the original descriptive data (age, sex, type of diabetes, the use of insulin, medical history including duration and medication use) were recorded. Then, Beck depression inventory and Cattell anxiety inventory were completed by all the individuals. Beck Depression Inventory contains 21 multiple choice questions and each option has a range of 0 to 3 scores; higher scores indicate the severity of depression. This questionnaire has a maximum score of 63 points in which 0 - 4 represents a potential denial, 5 - 9 indicates lack of depression, 10 - 18 indicates a mild depression, 19 - 29 indicates a moderate depression, and 30 - 63 indicates severe depression. The BDI demonstrates high internal consistency with a mean coefficient alpha of 0.86 reported for psychiatric groups and 0.81 for non-psychiatric groups (17). The validity and reliability of the Persian version of the Beck depression inventory in the previous studies have been approved with Cronbach's α of 0.83 to 0.85 (18-21).

Cattell anxiety inventory is a 40 item questionnaire. This scale does not show the scores of total anxiety, hidden or obvious anxiety, and the awareness or lack of awareness of an individual regarding one's self anxiety; moreover, its value should be interpreted in light of clinical experience. In this scale, 0 - 3 score represents a calm, phlegmatic, stable, comfortable, and non-stressed personality.

A score of 4 - 6 indicates a moderate degree of anxiety; a score of 7 - 8 indicates a neurotic anxious person; and finally a score of 9 - 10 indicates a person who clearly needs help either to modify his/her position or to receive consultation and psychotherapy (22). The validity of its Persian version has been determined and its reliability has been reported from 0.75 to 0.85 (18, 19, 23). After collecting the data, the results were analyzed using SPSS version 22. The data were presented using frequencies and percentages for categorical variables and for continuous variables, means and standard deviations were used. Variables were tested for normality distribution by Kolomogorov-Smirnov test. To compare continuous variables, the analysis of variance (ANOVA) was used and for comparing the categorical variables, chi-square test was used. P value < 0.05 was considered as the significant level.

3. Results

Regarding age and gender, there was no significant difference (P value < 0.05) between patients and the control group. The average age of the participants in the age range of 20 to 60 years was 37.9 ± 12.66 . The prevalence of depression and anxiety in patients with diabetes comparing to the control group is shown in Table 1. As can be seen, the prevalence of depression and anxiety in the patients group is significantly higher comparing to the control group.

In terms of the Maximum of mild anxiety, there were 52 diabetic individuals (41.6%) versus 69 individuals of the control group (55.2%); in terms of Moderate-severe anxiety, there were 73 cases (58.4%) versus 56 patients (44.8%) (P value = 0.031). In studying the Maximum of mild depression, there were 43 patients (34.4%) versus 92 (73.6%); in terms of Moderate-severe depression, there were 82 patients (65.6%) versus 33 (26.4%) (P value = 0.001, Table 1).

On a closer examination of the groups of patients (no control group), no significant relationship was found between age, type of diabetes, insulin injections, and the duration of diabetes with the anxiety levels of the patients; the results are shown in Table 2. Unlike anxiety, there was a significant relationship between the duration of diabetes and the different levels of depression; the results are shown in Table 3. However, regarding the type of treatment, there was no significant difference between insulin injections and age.

4. Discussion

The current study has been conducted with a need to determine the prevalence of depression and anxiety in diabetic patients in Qazvin. Results showed that anxiety is

Table 1. The Frequency of Depression and Anxiety in Patients and Control Group^a

Variables	Diabetic Patients	Non-Diabetic Patients	Total	P Value
Anxiety				0.031
Maximum of mild anxiety	52 (41.6)	69 (55.2)	121 (48.4)	
Moderate-severe anxiety	73 (58.4)	56 (44.8)	129 (51.6)	
Depression				0.001
Maximum of mild depression	43 (34.4)	92 (73.6)	135 (54)	
Moderate-severe depression	82 (65.6)	33 (26.4)	115 (46)	

^aValue are expressed as No. (%).

Table 2. The Relationship Between Age and Medical Records of Patients with Anxiety

Variables	Without Anxiety	Mild Anxiety	Neurotic Anxious	Sever Anxiety	P Value
Age, M (SD)	43.60 (8.82)	38.25 (11.64)	36.98 (14.02)	37.55 (12.16)	0.733
Injection of Insulin, No. (%)					0.952
Using	1 (20)	13 (27.7)	13 (23.6)	5 (27.8)	
Not using	4 (80)	34 (72.3)	42 (76.4)	13 (72.2)	
Diabetes, No. (%)					0.724
Type 1	0 (0)	9 (19.1)	10 (18.2)	4 (22.2)	
Type 2	5 (100)	38 (80.9)	45 (81.8)	14 (77.8)	
The duration of having diabetes, M (SD)	6.90 (6.54)	6.12 (3.13)	5.40 (3.10)	6.66 (4.02)	0.459

Table 3. The Relationship Between Age and Medical Records of Patients with Depression

Variables	Possible Denial	Lack of Depression	Mild Depression	Moderate Depression	Severe Depression	P Value
Age, M (SD)	34 (11.50)	39.20 (9.95)	43.88 (15.54)	37.26 (11.37)	33.46 (12.85)	0.081
Injection of Insulin, No. (%)						0.404
Using	3 (37.5)	1 (10)	9 (36)	15 (21.7)	4 (30.8)	
Not using	5 (62.5)	9 (90)	16 (64)	54 (78.3)	9 (69.2)	
Diabetes, No. (%)						0.91
Type 1	2 (25)	1 (10)	9 (16)	13 (18.8)	3 (23.1)	
Type 2	6 (75)	9 (90)	21 (84)	56 (81.2)	10 (76.9)	
The duration of having diabetes, M (SD)	4.25 (1.58)	4.90 (1.79)	8.56 (4.20)	5.76 (2.54)	6.07 (2.46)	0.001

significantly higher in diabetic patients comparing to the control group. These results are consistent with previous studies in the literature review. In a study conducted by Baker et al. anxiety in diabetic patients was 20% higher than healthy individuals (24).

The prevalence of anxiety in the current study was higher than other studies; for example, in a study conducted in Mexico, the prevalence of anxiety in diabetic patients was 52.9% (25). Regarding the difference in the

prevalence of anxiety and depression, it can be stated that anxiety and depression have epidemic progress and this trend emerges in the shape of the society's mental characteristics (26). For this reason, in the current study a control group was used, so that the progress of comparisons would be examined more realistically.

Determining the symptoms of diabetes and anxiety is important for the reason that reduced levels of blood sugar in some cases are mistaken for anxiety which can cause

the lack of response to low sugar levels and vice versa. In the current study, the prevalence of depression has been significantly higher in diabetic patients comparing to the control group. This finding is consistent with the findings of other studies. In a study by Yu, Ruan et al. conducted on diabetic patients, it has been shown that 28% of individuals suffered from depression among whom, 18% had mild depression, 6% had moderate depression, and only 4% suffered from severe depression (27). Also, in a study by Clarke et al. depression was higher in the disordered group comparing to the general population (28). For considering the cause of this issue, biological changes associated with depression which increase the possibility of developing diabetes can be pointed out. This impact applies by the difficulty in obtaining information about managing diabetes and the follow-up diabetes management (29).

Depression and anxiety are a normal part of the adaptation to lifestyle changes of people and over time, these feelings can turn into permanent depression and anxiety (5). Research shows that one-fourth of individuals who suffer from diabetes type 2 have experienced depression in their lives. This number is different for anxiety and it is about one-sixth. Regarding individuals with type 1 diabetes, this number for depression and anxiety is one-fifth and one-seventh, respectively (9). Since diabetes type 1 and 2 are somewhat different in terms of age, onset of disease, duration, management, and the symptoms, the current study was to examine the relationship between these two types of diabetes (30). Although the prevalence of depression and anxiety was higher in patients with type 2 diabetes comparing to type 1, this difference was not statistically significant. Many life aspects of diabetes such as the need to keep a diabetic diet, active lifestyle, target glucose levels, and starting insulin injection increase the risk of depression and anxiety (5). This has led this study to consider the relationship between the prevalence of depression and anxiety with the injection of insulin, the type of diabetes, and the duration of diabetes. The results showed that there is no significant relationship between these variables and the levels of anxiety. Unlike anxiety in the current study, there was a significant relationship between the duration of disease and depression. This relationship was also found in a study by Mosaku et al. (31). The results have shown that metabolic disorder of glucose in mild cases is associated with depression. When the duration of disease increases, it can cause the occurrence of symptoms and hopelessness of improvement which can show its effect as depression. In a study by Hermamms et al. this relationship has not been observed regarding anxiety (32). With these factors not being significant, it can be reasoned that people with diabetes may consider their anxiety and depression as a non-related result of diabetes. From these factors, constant

problems and stresses of life, serious medical conditions, drug abuse, personality factors, and chemical changes in the brain can be pointed out (32), so it is essential that future studies also consider these factors.

Anxiety and depression in some people can cause more problems for the management of diabetes. Regardless of whether the mental health conditions occur before or after the occurrence of diabetes, untreated depression can affect the ability of individuals to manage diabetes. Based on the assumptions presented in the literature review on the disorders of adrenal axis, pituitary, hypothalamus, and excessive activity of the sympathetic nervous system due to fears of symptoms and of mortality and the complications of physiological processes accelerates anxiety and depression in the elderly (33). This hypothesis led the current study to examine these relationships which there were no significant differences between age and mental health with the variables of the study. This finding was also confirmed by several other studies; of such studies, a study by Collins et al. can be mentioned (34).

Since the controlled study on this subject is limited and is mostly based on the self-report questionnaires, there is a need for diagnosis criteria in addition to the controlled study for more comprehensive results; this was one of the limitations of the current study. One of the advantages of the current study was the use of control group and an appropriate sample size for the final comparison. This fact improves the generalizability of the data. Early detection of risk factors associated with anxiety and depression in people with diabetes has a special importance and these factors have been examined in the current study as far as it was possible.

4.1. Conclusion

This study showed that anxiety and depression in people with diabetes are more common than in the control group in the city of Qazvin. These factors can lead to an increased risk of developing diabetes and reduced health, so it is necessary that primary care be developed by a system based on the reaction. Therefore, with the help of these factors, an effective treatment for mental health could take place. Such action could be a necessary infrastructure for the better management of diabetes and finally the impact of such interventions should be investigated.

Acknowledgments

The project has been registered in Qazvin University of Medical Sciences. Financial cooperation of research deputy and the university authorities is appreciated. Researchers, also, appreciate the sincere cooperation of the diabetic patients in doing this plan.

References

- WHO. What is diabetes? 2016. [updated 2016]. Available from: <http://www.who.int/diabetes/en/>.
- Nolan CJ, Ruderman NB, Kahn SE, Pedersen O, Prentki M. Insulin resistance as a physiological defense against metabolic stress: implications for the management of subsets of type 2 diabetes. *Diabetes*. 2015;**64**(3):673-86. doi: [10.2337/db14-0694](https://doi.org/10.2337/db14-0694). [PubMed: [25713189](https://pubmed.ncbi.nlm.nih.gov/25713189/)].
- Hu FB. Globalization of diabetes: the role of diet, lifestyle, and genes. *Diabetes Care*. 2011;**34**(6):1249-57. doi: [10.2337/dci11-0442](https://doi.org/10.2337/dci11-0442). [PubMed: [21617109](https://pubmed.ncbi.nlm.nih.gov/21617109/)].
- Restrepo BI, Camerlin AJ, Rahbar MH, Wang W, Restrepo MA, Zarate I, et al. Cross-sectional assessment reveals high diabetes prevalence among newly-diagnosed tuberculosis cases. *Bull World Health Organ*. 2011;**89**(5):352-9. doi: [10.2471/BLT.10.085738](https://doi.org/10.2471/BLT.10.085738). [PubMed: [21556303](https://pubmed.ncbi.nlm.nih.gov/21556303/)].
- Ganasegeran K, Renganathan P, Manaf RA, Al-Dubai SA. Factors associated with anxiety and depression among type 2 diabetes outpatients in Malaysia: a descriptive cross-sectional single-centre study. *BMJ Open*. 2014;**4**(4):e004794. doi: [10.1136/bmjopen-2014-004794](https://doi.org/10.1136/bmjopen-2014-004794). [PubMed: [24760351](https://pubmed.ncbi.nlm.nih.gov/24760351/)].
- Golozar A, Khademi H, Kamangar F, Poutschi H, Islami F, Abnet CC, et al. Diabetes mellitus and its correlates in an Iranian adult population. *PLoS One*. 2011;**6**(10):e26725. doi: [10.1371/journal.pone.0026725](https://doi.org/10.1371/journal.pone.0026725). [PubMed: [22053206](https://pubmed.ncbi.nlm.nih.gov/22053206/)].
- Garber AJ, Abrahamson MJ, Barzilay JI, Blonde L, Bloomgarden ZT, Bush MA, et al. AACE comprehensive diabetes management algorithm 2013. *Endocr Pract*. 2013;**19**(2):327-36. doi: [10.4158/endorp.19.2.a38267720403k242](https://doi.org/10.4158/endorp.19.2.a38267720403k242). [PubMed: [23598536](https://pubmed.ncbi.nlm.nih.gov/23598536/)].
- Smith KJ, Beland M, Clyde M, Garipey G, Page V, Badawi G, et al. Association of diabetes with anxiety: a systematic review and meta-analysis. *J Psychosom Res*. 2013;**74**(2):89-99. doi: [10.1016/j.jpsychores.2012.11.013](https://doi.org/10.1016/j.jpsychores.2012.11.013). [PubMed: [23332522](https://pubmed.ncbi.nlm.nih.gov/23332522/)].
- Singh H, Gonder-Frederick L, Schmidt K, Ford D, Vajda KA, Hawley J, et al. Assessing hyperglycemia avoidance in people with Type 1 diabetes. *Diabetes Manag*. 2014;**4**(3):263-71. doi: [10.2217/dmt.14.3](https://doi.org/10.2217/dmt.14.3).
- Campayo A, Gomez-Biel CH, Lobo A. Diabetes and depression. *Curr Psychiatry Rep*. 2011;**13**(1):26-30. doi: [10.1007/s11920-010-0165-z](https://doi.org/10.1007/s11920-010-0165-z). [PubMed: [21052874](https://pubmed.ncbi.nlm.nih.gov/21052874/)].
- Roy MS, Roy A, Affouf M. Depression is a risk factor for poor glycemic control and retinopathy in African-Americans with type 1 diabetes. *Psychosom Med*. 2007;**69**(6):537-42. doi: [10.1097/PSY.0b013e3180df84e2](https://doi.org/10.1097/PSY.0b013e3180df84e2). [PubMed: [17634567](https://pubmed.ncbi.nlm.nih.gov/17634567/)].
- Van Tilburg MA, McCaskill CC, Lane JD, Edwards CL, Bethel A, Feinglos MN, et al. Depressed mood is a factor in glycemic control in type 1 diabetes. *Psychosom Med*. 2001;**63**(4):551-5. doi: [10.1097/00006842-200107000-00005](https://doi.org/10.1097/00006842-200107000-00005). [PubMed: [11485108](https://pubmed.ncbi.nlm.nih.gov/11485108/)].
- Gendelman N, Snell-Bergeon JK, McFann K, Kinney G, Paul Wadwa R, Bishop F, et al. Prevalence and correlates of depression in individuals with and without type 1 diabetes. *Diabetes Care*. 2009;**32**(4):575-9. doi: [10.2337/dc08-1835](https://doi.org/10.2337/dc08-1835). [PubMed: [19171719](https://pubmed.ncbi.nlm.nih.gov/19171719/)].
- Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: a meta-analysis. *Diabetes Care*. 2001;**24**(6):1069-78. doi: [10.2337/diacare.24.6.1069](https://doi.org/10.2337/diacare.24.6.1069). [PubMed: [11375373](https://pubmed.ncbi.nlm.nih.gov/11375373/)].
- Pouwer F, Nefs G, Nouwen A. Adverse effects of depression on glycemic control and health outcomes in people with diabetes: a review. *Endocrinol Metab Clin North Am*. 2013;**42**(3):529-44. doi: [10.1016/j.ecl.2013.05.002](https://doi.org/10.1016/j.ecl.2013.05.002). [PubMed: [24011885](https://pubmed.ncbi.nlm.nih.gov/24011885/)].
- Hasan SS, Clavarino AM, Dingle K, Mamun AA, Kairuz T. Diabetes Mellitus and the Risk of Depressive and Anxiety Disorders in Australian Women: A Longitudinal Study. *J Womens Health (Larchmt)*. 2015;**24**(11):889-98. doi: [10.1089/jwh.2015.5210](https://doi.org/10.1089/jwh.2015.5210). [PubMed: [26121486](https://pubmed.ncbi.nlm.nih.gov/26121486/)].
- Groth-Marnat G. Handbook of psychological assessment. John Wiley & Sons; 2009.
- Ataei B, Khorvash F, Salehi M, Houshmand S, Kassaian N, Babak A, et al. The relative frequency of depression and anxiety in patients with hepatitis b referring to infectious diseases and tropical medicine research center, Isfahan, Iran. *J Isfahan Med Sch*. 2012;**29**(169).
- Abbasi M, Yazdi Z, Farrokh Z, Haji Seid Javadi SA. Association of depression and anxiety with osteoarthritis. *J Qazvin Uni Med Sci*. 2014;**18**(4):28-34.
- Hojat M, Shapurian R, Mehryar AH. Psychometric properties of a Persian version of the short form of the Beck Depression Inventory for Iranian college students. *Psychol Rep*. 1986;**59**(1):331-8. doi: [10.2466/pr0.1986.59.1.331](https://doi.org/10.2466/pr0.1986.59.1.331). [PubMed: [3737815](https://pubmed.ncbi.nlm.nih.gov/3737815/)].
- Hojat M, Shapurian R, Mehryar AH. Dimensionality of the short form of the Beck Depression Inventory: a study with Iranian college students. *Psychol Rep*. 1986;**59**(3):1069-70. doi: [10.2466/pr0.1986.59.3.1069](https://doi.org/10.2466/pr0.1986.59.3.1069). [PubMed: [3823312](https://pubmed.ncbi.nlm.nih.gov/3823312/)].
- Taghizadeh ME, Mohammadi N. The role of mothers' marital satisfaction on predicting anxiety and self-concept of female adolescents. *Knowl Res Appl Psychol*. 2014;**15**(58):79-87.
- Dadsetan P, Mansour M. Mental disorders. *Tehran: Darya*. 1989.
- Li C, Barker L, Ford ES, Zhang X, Strine TW, Mokdad AH. Diabetes and anxiety in US adults: findings from the 2006 Behavioral Risk Factor Surveillance System. *Diabet Med*. 2008;**25**(7):878-81. doi: [10.1111/j.1464-5491.2008.02477.x](https://doi.org/10.1111/j.1464-5491.2008.02477.x). [PubMed: [18644077](https://pubmed.ncbi.nlm.nih.gov/18644077/)].
- Tovilla-Zarate C, Juarez-Rojop I, Peralta Jimenez Y, Jimenez MA, Vazquez S, Bermudez-Ocana D, et al. Prevalence of anxiety and depression among outpatients with type 2 diabetes in the Mexican population. *PLoS One*. 2012;**7**(5):e36887. doi: [10.1371/journal.pone.0036887](https://doi.org/10.1371/journal.pone.0036887). [PubMed: [22629339](https://pubmed.ncbi.nlm.nih.gov/22629339/)].
- Vasegh S, Mohammadi MR. Religiosity, anxiety, and depression among a sample of Iranian medical students. *Int J Psychiatry Med*. 2007;**37**(2):213-27. doi: [10.2190/J3V5-L316-0U13-7000](https://doi.org/10.2190/J3V5-L316-0U13-7000). [PubMed: [17953238](https://pubmed.ncbi.nlm.nih.gov/17953238/)].
- Yu R, Y. Hua L, Hong L. Depression in newly diagnosed type 2 diabetes. *Int J Diabetes Dev Ctries*. 2010;**30**(2):102-4. doi: [10.4103/0973-3930.62601](https://doi.org/10.4103/0973-3930.62601). [PubMed: [20535315](https://pubmed.ncbi.nlm.nih.gov/20535315/)].
- Clarke DM, Currie KC. Depression, anxiety and their relationship with chronic diseases: a review of the epidemiology, risk and treatment evidence. *Med J Aust*. 2009;**190**(7 Suppl):S54-60. [PubMed: [19351294](https://pubmed.ncbi.nlm.nih.gov/19351294/)].
- Egede LE, Ellis C. Diabetes and depression: global perspectives. *Diabetes Res Clin Pract*. 2010;**87**(3):302-12. doi: [10.1016/j.diabres.2010.01.024](https://doi.org/10.1016/j.diabres.2010.01.024). [PubMed: [20181405](https://pubmed.ncbi.nlm.nih.gov/20181405/)].
- Chen PC, Chan YT, Chen HF, Ko MC, Li CY. Population-based cohort analyses of the bidirectional relationship between type 2 diabetes and depression. *Diabetes Care*. 2013;**36**(2):376-82. doi: [10.2337/dci12-0473](https://doi.org/10.2337/dci12-0473). [PubMed: [23150281](https://pubmed.ncbi.nlm.nih.gov/23150281/)].
- Mosaku K, Kolawole B, Mume C, Ikem R. Depression, anxiety and quality of life among diabetic patients: a comparative study. *J Natl Med Assoc*. 2008;**100**(1):73-8. doi: [10.1016/S0027-9684\(15\)31178-0](https://doi.org/10.1016/S0027-9684(15)31178-0). [PubMed: [18277812](https://pubmed.ncbi.nlm.nih.gov/18277812/)].
- Hermanns N, Kulzer B, Krichbaum M, Kubiak T, Haak T. Affective and anxiety disorders in a German sample of diabetic patients: prevalence, comorbidity and risk factors. *Diabet Med*. 2005;**22**(3):293-300. doi: [10.1111/j.1464-5491.2005.01414.x](https://doi.org/10.1111/j.1464-5491.2005.01414.x). [PubMed: [15717877](https://pubmed.ncbi.nlm.nih.gov/15717877/)].
- Gonzalez JS, Esbitt SA, Schneider HE, Osborne PJ, Kupperman EG. Psychological Co-Morbidities of physical illness. Springer; 2011. pp. 73-121. Psychological issues in adults with type 2 diabetes.
- Collins MM, Corcoran P, Perry IJ. Anxiety and depression symptoms in patients with diabetes. *Diabet Med*. 2009;**26**(2):153-61. doi: [10.1111/j.1464-5491.2008.02648.x](https://doi.org/10.1111/j.1464-5491.2008.02648.x). [PubMed: [19236618](https://pubmed.ncbi.nlm.nih.gov/19236618/)].