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Original article

Prevalence of Depression and Its Associated Factors among Adult Libyan Diabetic Patients Attending Golden Polyclinic, Al-Badri, Tripoli

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ABSTRACT

Background and aims: *Depression is a significant public health concern and a common comorbid condition among patients with diabetes mellitus. This study aims to assess the prevalence of depression and its associated factors among patients with diabetes in the Al-Badri polyclinic.* ***Methods****: A descriptive cross-sectional study was conducted at Al-Badri Polyclinic from February to April 2024. The presence of depression among diabetes patients was assessed using the 9-item Patient Health Questionnaire (PHQ-9) scale. Data was entered and analyzed by using SPSS software version 26.* ***Results****: A total of two hundred and forty-seven participants were enrolled in the study, with 142 (57.5%) being female and 168 (68.0%) aged between 41 and 60 years. The majority of participants (71.7%) were married, and 40.5% were employed. Additionally, 78% had a positive family history of diabetes mellitus. Among the participants, 43.3% were smokers. The duration of diabetes mellitus was more than 10 years for 52.2% of the patients. Approximately two-thirds of the patients (61.5%) were taking tablets for the treatment of DM. The majoring of the patients (98.8%) had an HbA1c level of 6.5 or higher. Approximately one-third of the patients had hypertension as a comorbidity with DM, and 12.1% had heart disease as a complication of diabetes. The overall prevalence of moderate depression among the diabetes patients at the clinic was 24.7%. The majority (70.4%) exhibited mild depression, and 4.9% experienced minimal depression. No cases of severe depression were identified. Factors independently associated with depression included being on age, marital status, insulin therapy, and comorbidities.* ***Conclusion****: Depression was prevalent in our diabetic patients. Factors independently associated with this included being on age, marital status, insulin therapy, and comorbidities. The study emphasizes and recommends the importance of identifying and managing depression among diabetes patients. It is also recommended to increase awareness of the benefits of early diagnosis of patients to prevent major forms of depression and cost saving for the health system. Programs for screening depression should be implemented in primary care settings.*

Keywords: Depression, Libyan Diabetic Patients, Golden Polyclinic, Tripoli.

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خلفية وأهداف الدراسة: يعد الاكتئاب من المشاكل الصحية العامة الكبيرة كما يعتبر من الامراض الشائعة بين مرضى داء السكري. تهدف هذه الدراسة إلى تقييم معدل انتشار الاكتئاب وتحديد العوامل المرتبطة به بين مرضى السكري في عيادات مجمع البدري. **منهجية الدراسة**: أجريت هذه الدراسة الوصفية المقطعية في عيادات مجمع البدري والتي امتدت من شهر فبراير إلى غاية أبريل 2024، كما تم تقييم حالات الاكتئاب بين مرضى السكري باستخدام استبيان PHQ-9 والذي يضم 9 بنود. استخدم برنامج SPSS اصدار 26 في إدخال البيانات وتحليلها. **النتائج**: شارك في الدراسة 247 من ضمنهم 142 (57.5%) إناث كان فيهم 168 (68%) اعمارهم تتراوح بين 41 و 60 عاماً. غالبية المشاركين في الدراسة كانوا متزوجين

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(71.7%) وكان منهم 40.5% لديهم اشغال يعملونها. التاريخ العائلي لمرض السكري كان موجود بين 78% منهم. ما نسبته 43.3% من المشاركين في الدراسة كانوا مدخنين. الفترة الزمنية لمرض السكري بين هؤلاء المرضى 52.2% كانت تزيد على 10 سنوات. ثلث المرضى 61.5% كانوا يتلقون أقراصاً لعلاج مرض السكري وكان التحليل التراكمي للسكر لغالبية المرضى 98.8% عند مستوى 6.5 أو ازيد من ذلك. يعاني ثلثي المرضى من ارتفاع ضغط الدم كمرض مصاحب لداء السكري، كما كان 12.1% منهم يعانون من امراض القلب بسبب مضاعفات السكري. بلغ معدل انتشار الاكتئاب ذو المستوى المعتدل 24.7%، بينما معدل الاكتئاب الخفيف 70.4% والبسيط كان 4.9%. لم يتم تحديد اي حالات اكتئاب حاد. تشمل العوامل المرتبطة بشكل مستقل بالاكتئاب التقدم في السن والحالة الاجتماعية وعلاج الانسولين والامراض المصاحبة. **الاستنتاج**: اشارت الدراسة إلى ان الاكتئاب منتشراً بين مرضى السكري في هذه الدراسة. من بين العوامل المرتبطة بشكل مستقل هي العمر والحالة الاجتماعية وعلاج الانسولين والامراض المصاحبة. تؤكد الدراسة وتوصي بأهمية تحديد الاكتئاب ومعالجته بين مرضى السكري. كما توصي بزيادة الوعي بفوائد التشخيص المبكر للمرضى للوقاية من أشكال الاكتئاب الرئيسية وتوفير الامكانيات لتقديم الرعاية الصحية وتنفيذ برامج فحص الاكتئاب في مراكز الرعاية الأولية.

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by hyperglycemia with disturbances in carbohydrate, protein, and fat metabolism [1]. The prevalence of diabetes mellitus (among individuals aged 20 to 79) in Libya was reported to be 8.7% in 2021, according to the World Bank collection of development indicators, compiled from officially recognized sources [2]. It is considered a leading cause of disability and mortality, with around 12% of healthcare costs in many countries allocated to preventing diabetes complications [3]. DM has social and psychological impacts that increase the risk of depression [4].

Depression complicates the management of chronic diseases and is associated with poorer clinical outcomes compared to having depression alone [5]. Depression in diabetic patients is often undiagnosed and untreated, leading to poor self-care and resulting in adverse health outcomes, including diabetic complications, functional impairment, and increased healthcare burden [6]. The causes of depression in diabetes are still unknown but may be related to genetic, biological, and psychological factors [7]. Many neurotransmitter and neuroendocrine defects have been identified as related to both depression and diabetes [8]. Depression is a condition of low mood that affects a person's feelings, behavior, and sense of wellbeing. Depressed individuals often feel sad, anxious, empty, hopeless, worthless, guilty, or restless [9]. Worldwide depression is the second-leading cause of disability, and diabetic patients are more likely to develop depression than nondiabetic individuals. It is estimated that 15-20% of people with diabetes struggle with depression, often in moderate to severe forms [6].

The prevalence of depression among diabetics is 2-3 times higher than in the general population. Diabetes and depression are major health problems worldwide. Most studies related to depression in DM have been conducted in high-income countries, but little is known about this issue in developing countries [10]. DM involves multiple systems. With adequate mental health care and adherence to treatment plans, the outcome for diabetic patients and the rate of complications could be significantly improved [11]. Recent studies have shown that depression may be particularly prevalent in people with diabetes [12]. Recognizing and treating depression in diabetic individuals is crucial for alleviating the psychiatric disorder and may also be important for managing diabetes itself, as depression is associated with poorer glucose regulation and decreased adherence to treatment regimen [13, 14].

The International Diabetes Federation (IDF) recommends periodic assessment and monitoring of depression among patients with diabetes, as they are at high risk for developing depression [15]. This study aimed to determine the prevalence of depression among patients with Type 2 diabetes mellitus attending diabetic clinics in Al-Badri polyclinic.

METHODS

A descriptive cross-sectional study was conducted at the diabetic clinic in the Al-Badri polyclinic from February to April 2024. Convenience sampling (a nonprobability sampling method) was carried out for

this study. Inclusion criteria comprised Libyan patients aged 18 and older diagnosed with diabetes mellitus. And exclude all non-Libyan patients, those diagnosed with any form of mental disorder, women with gestational diabetes, and individuals who refuse to participate in the study.

A structured questionnaire was used to gather sociodemographic data, including age, sex, marital status, occupation, family history, and smoking status. Furthermore, Diabetes-related variables such as the duration of diabetes, current treatments, last HBA1c levels, the presence of other diseases, and whether the patients experienced any complications of diabetes were collected. Face-to-face interviews were carried out by the medical doctor on duty in the diabetes clinic. In this study, depression was defined using the Arabic version of the validated PHQ-9 tool which was validated and deemed suitable for screening purposes to assessing depression. [16,17,18]. The Patient Health Questionnaire (PHQ-9) is a nine-item questionnaire that aids in diagnosing depression and evaluating its severity. Where the patients can determine the frequency of each symptom, they have experienced in the last two weeks. The questionnaire is based on the diagnostic criteria for major depressive disorder outlined in the Diagnostic and Statistical Manual, Fourth Edition (DSM-IV). Participants were categorized and graded based on their depression scores as follows: scores of 0 indicated no depression, 1-4 minimal depression, 5-9 mild depression, 10-19 moderate depression, and 20-27 severe depression. The prevalence of depression is commonly assessed using a cutoff score of ≥10, which is widely recognized as an indicator of positive depression cases. This threshold is also employed in cost-analysis studies to estimate the number of individuals who might need treatment [15].

The collected data was analyzed by the Statistical Package for Social Science (SPSS) version 26. Descriptive statistics were conducted for all variables and presented as mean ± standard deviation (SD). The Chi-square test was used to assess associations between variables, with a p-value of <0.05 considered statistically significant.

RESULTS

A total of 247 diabetic patients participated in this study. Nearly two-thirds of the participants (68%) were aged between 41 and 60 years, with a mean age of 54.5 ± 11.1 years. The majority of participants were females 142 (57.5%) and 105 (42.5%) were males. The majority of participants (71.7%) were married, and 40.5% were employed. The sociodemographic characteristics of the study population are shown in Table 1.

Table 1. Socio-demographic characteristics of the study population (n = 247).

Variable	Frequency	Percentage (%)
Age group (years)		
- ≤ 20	0	0.00
- 21-40	22	8.90
- 41-60	168	68.0
- ≥ 61	57	23.1
Gender		
- Male	105	42.5
- Female	142	57.5
Marital Status		
- Single	37	15.0
- Married	177	71.7
- Divorced	7	2.80
- Widow	26	10.5
Occupation		
- Employed	100	40.5
- Teacher	28	11.3
- Retired	26	10.5
- Housewife	84	34.0
- Businessman	9	3.60

Additionally, 78% had a positive family history of diabetes mellitus (DM). Among the participants, 43.3% were smokers. The duration of diabetes mellitus was more than 10 years for 52.2% of the patients.

Approximately two-thirds of the patients (61.5%) were taking tablets for the treatment of DM. The majoring of the patients (98.8%) had an HbA1c level of 6.5 or higher. Approximately one-third of the patients had hypertension as a comorbidity with DM, and 12.1% had heart disease as a complication of diabetes. The clinical characteristics of diabetic patients are shown in Table 2.

Table 2. The Clinical characteristics of the diabetic patient under the study (n = 247).

Clinical Characteristic	Frequency	Percentage (%)
Family History of DM		
- No	53	21.50
- Yes	194	78.50
Smoking		
- No	139	56.70
- Yes	106	43.30
Duration of DM		
- 1-10 years	118	47.80
- > 10 years	129	52.20
Treatment of DM		
- Tablets	150	61.50
- Insulin	34	13.90
- Tablets & Insulin	60	24.60
- No treatment	0	0.00
HbA1c		
- ≤ 5.6	3	1.20
- 5.7-6.4	0	0.00
- ≥ 6.5	244	98.8
Other Diseases		
- No Diseases	163	66.00
- Hypertension	63	25.50
- Hypothyroidism	3	1.20
- Rheumatoid Arthritis	3	1.20
- Hypertension + Gout	3	1.20
- Hypertension + Rheumatoid Arthritis	4	1.60
- Hypertension + Hypothyroidism	8	3.20
Diabetes complication		
- No complication	157	63.6
- Diabetic Foot	3	1.20
- Renal Disease	22	8.90
- Eye Disease	24	9.70
- Heart Disease	30	12.1
- Peripheral Neuropathy	6	2.40
- Renal Disease + Eye Disease	3	1.20
- others	2	0.80

The overall prevalence of depression, as measured by the Patient Health Questionnaire-9 (PHQ-9) with a cut-off score of ≥ 10, in this study was approximately one-quarter of the diabetic patients were classified as depressed. Among the participants, 12 (4.9%) experienced minimal depression, 174 (70.4%) had mild depression, and 61 (24.7%) had moderate depression (Figure 1).

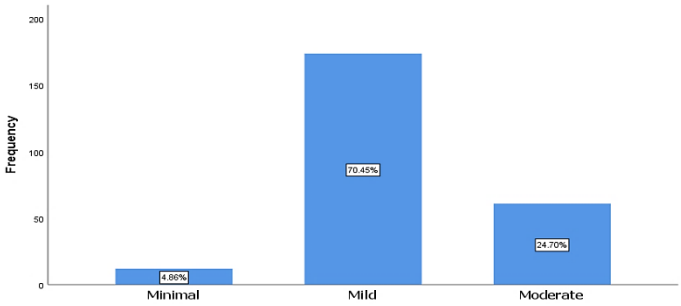

Figure 1. Distribution of depression among diabetes patients2024 by using PHQ9.

The data reveals that the most prevalent symptom is loss of concentration, affecting 45.3% of patients, followed by insomnia at 38.5%. The least common symptom is suicidal thoughts, reported by 2.8% of patients. The distribution of depression symptoms among diabetic patients by using PHQ9 is shown in (Figure 2).

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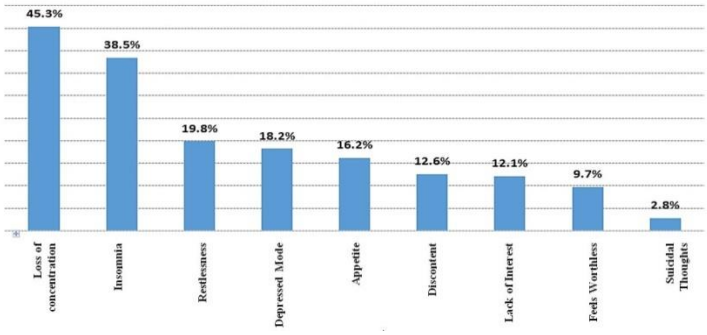

Figure 2: Distribution of depression symptoms among diabetic patients by using PHQ9.

Chi-square test, were used to examine for the bivariate association between the studies variables and depression score with a level of significance for a P-value of less than 0.05. The association is presented in Table 3. The highest prevalence of depression was observed in the 21-40 year age group (45.5%), while the lowest prevalence was found in those between 41 and 60 years (20.8%). A clear statistically significant association was found between age and the proportion of depression (P=0.03). However, the proportion of depression was significantly higher in males (29.5%) compared to females (21.1%). No statistically significant association was found between the gender and proportion of depression (P=0.13).

The prevalence of depression was significantly higher among single patients (43.2%) (P = 0.02) and those working in a teaching occupation (39.3%) (P = 0.21). Depression is significantly more prevalent among those receiving insulin treatment (55.9%) (P=0.00) compared to the patients who take tablets as a treatment for diabetes (17.3%). Additionally, the patients who have results of HbA1c less than 5.6 exhibit a significantly higher prevalence of depression (100%) than the other patients (23.8%) (P=0.0.002).

Tables 3 also outline the clinical factors and lifestyle variables linked to the prevalence and severity of depression. The highest prevalence of depression, 19%, is observed among individuals with diabetic patients who have hypertension, a statistically significant correlation (P=0.00). Among Libyan diabetic patients, depression is most frequent in those with diabetic heart disease complications (40%); followed by renal disease (27.3%), eye complications (12.5%), and no complications (25%). Additionally, 100% of three diabetic patients with rheumatoid arthritis experience moderate depression, a significant finding (P=0.00). No significant relationship exists between the duration of diabetes mellitus and the prevalence or severity of depression among diabetic patients (P=0.73).

Table 3. Association between sociodemographic/clinical characteristics and depression

Variable	Minimal - Mild Depression (%) (n = 186)	Moderate Depression (%) (n = 61)	Total (N = 247)	p-value
Age group (years)				
- ≤ 20	0	0.00	0	
- 21-40	54.5	45.5	22	
- 41-60	79.2	20.8	168	
- ≥ 61	71.9	28.1	57	**0.033**[c]
Gender				
- Male	70.5	29.5	105	
- Female	78.9	21.1	142	0.13[c]
Marital Status				
- Single	56.8	43.2	37	
- Married	77.4	22.6	177	
- Divorced	71.4	28.6	7	
- Widow	88.5	11.5	26	**0.021**[c]
Occupation				
- Employed	75.0	25.0	100	
- Teacher	60.7	39.3	28	
- Retired	73.1	26.9	26	
- Housewife	82.1	17.9	84	
- Businessman	66.7	33.3	9	0.21[c]
Family History of DM				
- No	77.4	22.6	53	
- Yes	74.7	25.3	194	0.69[c]
Smoking				
- No	74.1	25.9	139	
- Yes	76.4	23.6	106	0.67[c]
Duration of DM				
- 1-10 years	76.3	23.7	118	
- > 10 years	74.4	25.6	129	0.73[c]
Treatment of DM				
- Tablets	82.7	17.3	150	
- Insulin	44.1	55.9	34	
- Tablets & Insulin	73.3	26.7	60	
- No treatment	0	0.00	0	**0.00**[c]
HbA1c				
- ≤ 5.6	0.00	100	3	
- 5.7-6.4	0	0.00	0	
- ≥ 6.5	76.2	23.8	244	**0.002**[c]
Other Diseases				
- No Diseases	73.6	26.4	163	
- Hypertension	81.0	19.0	63	
- Hypothyroidism	100	0.00	3	
- Rheumatoid Arthritis	0.00	100	3	
- Hypertension + Gout	100	0.00	3	
- Hypertension + Rheumatoid Arthritis	100	0.00	4	
- Hypertension + Hypothyroidism	100	0.00	8	**0.00**[c]
Diabetes complication				
- No complication	74.5	25.5	157	
- Diabetic Foot	100	0.00	3	
- Renal Disease	72.7	27.3	22	
- Eye Disease	87.5	12.5	24	
- Heart Disease	60.0	40.0	30	
- Peripheral Neuropathy	100	0.00	6	
- Renal Disease + Eye Disease	100	0.00	3	
- Complication occurrence	100	0.00	2	0.16[c]

[C]: Chi-square test. P < 0.05 is statistically significant

DISSCUSION

247 participants (24.7%) indicated experiencing moderate levels of depression. Although predominantly categorized as minimal or mild, approximately 75.3% of all depressed individuals in the study were in these categories. However, none were diagnosed with severe depression. The prevalence of moderate depression among diabetes patients in this investigation (24.7%) is consistent with findings from a study in Libya [19] and with study in Tunisia [20]. The result was disagreement with a study in Tanzania by Khan Z [15].

The results demonstrate a significant correlation between depression and age (P=0.03). This finding aligns with a study conducted in Dubai, which indicated a significant link between age, depression, and diabetes [21]. This finding could be attributed to the fact that aging is accompanied by a longer duration of the disease and the presence of complications. Contrary to this finding, other studies reported that younger age was associated with a higher prevalence of depression because of more conflicts, stress, and irritability [22]. In contrast, results from other studies in Palestine, Ethiopia, and Egypt reported no association between age and the prevalence of depression among patients [16,23,24]. This study found no significant relationship between depressive symptoms and the gender of the patients (P=0.13). Similar findings have been reported in the study conducted in Tanzania & Mexico [15,25]. However, contrasting results were observed in Palestine [16].

In the current study, marital status was also significantly associated with depression (P=0.02), consistent with a Saudi study [18] which found that marital status was significantly associated with depression (P=0.001). Conversely, another research in Saudi Arabia [26] indicated that there is no association significance between depression and marital status among diabetic patients (P=0.13). Associations of marital status also stand out in our study, as widowed and divorced persons are associated with the presence of depression, while being married was a protective factor. These associations have already been reported in other populations, such as in Tellez-Zenteno's study [27]. This study didn't show a significant relationship between depression and occupation (P=0.21); similar findings were shown by a study conducted in Egypt (P=0.74) [24]. In this study, no significant relationship between depressive symptoms and the family history (P=0.69), duration of diabetes mellitus (P=0.73), and smoking (P=0.67). Those findings are consistent with a study in Tanzania, except for smoking, which showed a strong relation with depression in the same study [15].

In this study, depression showed a significant association with insulin therapy (P=0.00). Patients receiving insulin were nearly double compared to those using other therapies (55.9%). Similar associations between insulin therapy and depression have been documented in studies conducted in China [28]. A recent meta-analysis has provided additional evidence supporting this association. Negative perceptions of insulin therapy, such as fear about self-injection, adjusting doses, and the progression of the disease resulting in complications, contribute to psychological stressors that may trigger depression in these patients [29]. In the current study, the finding showed that poorly or uncontrolled diabetes would increase the risk of having depression. A strong significant relationship between depression and HbA1c level (P=0.002). A similar result was reported in many studies worldwide [22, 27]. On the other hand, an alternative study [30] did not detect an association between the variation of HbA1c levels and depression status.

The current study demonstrates a strong statistical significance in depression among diabetic patients with comorbidity diseases and more among hypertension (P=0.00). Our findings are consistent with recent studies in other countries that reported a significant association between depression and diabetic patients with comorbidity [19, 31]. However, the relation wasn't statistically significant in another study in Saudi Arabia [26].

CONCLUSION

The prevalence of depression was high in this diabetic population. While most patients showed minimal depression, approximately 30% had either mild or moderate depression. The result of this study emphasizes and recommends the importance of identifying and managing depression among diabetes patients. We confirmed from our study that depression is prevalent in Libyan adult patients with diabetes and identified some risk factors for depression among diabetic patients, such as age, marital status, insulin therapy, and comorbidities. These findings offer valuable insights that can help identify and address modifiable factors associated with depression in individuals with diabetes.

Recommendations

It is imperative for physician to consistently evaluate their patients for depression utilizing the PHG-9 or other validated assessment instruments. Collaborative efforts among healthcare providers are essential to develop comprehensive treatment plans that address both diabetes and depression, while also closely monitoring these conditions to identify the most efficacious interventions. Moreover, healthcare professionals must consider the impact of diabetes on patients' quality of life and mental health. Consequently, the early identification of depression through systematic screening programs, coupled with timely therapeutic interventions, offers the most effective protection against the adverse effects of depression on diabetes outcomes. The provision of psychological services for individuals with diabetes is essential.

Ethical issue

Ethical approval to conduct the study was obtained from the manager of Al-Badri Polyclinic. Before enrollment, all patients provided informed consent to participate after explaining the aim of the study. Data collected during the study was anonymized to ensure confidentiality.

Study limitation

The primary limitation of this study is that data were collected from a single primary healthcare center, which restricts the external validity of the findings. Additionally, the study's cross-sectional design and the utilization of a non-probability sampling method further constrain the generalizability of the results. Although the PHQ-9 questionnaire is recognized as an effective tool for depression screening, relying on self-reported data rather than clinical diagnosis by a physician is a significant drawback. The cross-sectional nature of the analysis precludes any determination of causation or temporal relationships between depression and adult diabetes. Furthermore, the study underestimates the true prevalence of depression, as individuals suffering from depression might be less inclined to participate in the research. Lastly, the scope of evaluating overall prevalence is limited, as the study was conducted exclusively within a single primary healthcare center in our country.

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Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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