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Research Article

Prevalence and Determinants of Depression Among the Diabetic Libyan Patients in Primary Health Care Centers During 2020

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Abstract

Background: Diabetic patients have a relatively high prevalence of depressive symptoms, and self-harm thoughts often complicate their emotional disturbances. The risk factors of the comorbidity of depression and diabetes should be taken into consideration to decrease problems arising because of the comorbidity of these two conditions.

Objectives: This study was undertaken to determine the prevalence of depression and its severity among diabetic patients and correlate it with sociodemographic, lifestyle, and clinical characteristics.

Materials and Methods: A cross-sectional study was conducted from January 2020 to October 2022. The study included 400 patients with Type 1 and Type 2 diabetes attending diabetic clinics in primary health care centers in Tripoli-Libya of both sexes; the sample excluded pregnant women and those with advanced complications. The patients were assessed for depression using the Patient Health Questionnaire-9. The relationship between depression, diabetic control, and sociodemographic characteristics was analyzed using Chi-square and ANOVA analyses, which estimated the significant factors that were dependently associated with depression.

Results: The sample study included 400 participants; the study reveals that 30.5% of diabetic patients reported depressive symptoms; 15% had moderate depression; 10% had moderately severe depression; and 5.5% had severe depression. There was a statistically significant relation between depression and female gender, married patient, house ownership, poor drug adherence, diabetic complications, especially in the eye, poor diet control, physical inactivity, sleep disturbance, self-harm ideation, and difficulty dealing with ordinary life.

Conclusion: The study found that 30.5% of diabetic patients attending primary health care centers in 2020 in Tripoli were depressed.

Keywords: Diabetes Mellitus (DM); Depression

Introduction

Diabetes mellitus (DM) is a complex chronic metabolic disorder reflected by increased blood glucose concentration [1] which caused by genetics and environmental factors. This metabolic dysregulation leads to multisystem progressive complications [2]. The disease requires constant self-management and is known to pose psychological and emotional burdens [1,2]. Globally, estimates establish a rise in the prevalence of DM; more than half a billion people worldwide have diabetes [3]. There are interrelationships between psychological and physical health, chronic medical problems that increase the feeling of otherness, and solitude that can frequently result in temporary or chronic depression [4]. According to Eaton (2002), diabetic patients face a variety of psychological challenges, including (1) adherence to medical treatment and lifestyle modifications; (2) the need for ongoing glycemic control monitoring and concerns about complications and disabilities; and (3) epidemiologic studies conducted in both community and medical settings find that people with diabetes are more likely than others to experience depression [5]. Depression is considered a common comorbidity among diabetes patients, affecting about 20% [6,7]. Diabetes and depression are the chief public health problems, demanding improvement in their management [8]. There is a lack of recent estimates of depression prevalence among DM patients in Libya. This study aimed to determine the prevalence of depression and its severity among Libyan diabetic patients and correlate it with sociodemographic, lifestyle, and clinical characteristics.

Methods

It is a descriptive cross-sectional study conducted in diabetic clinics in five primary healthcare facilities in Tripoli, Libya. Alhani Polyclinic [Souq Aljuma Municipality], Airport Road Poly Clinic [Abu Saleem Municipality], Abushosha Polyclinic [Tajoura Municipality], Qaser Ben Ghashier Health Center [Qaser Ben Gashier Municipality], Shuhada Alminshia Health Center [Tripoli Center Municipality]. From January 2020 to October 2020, the sample selected under inclusion criteria: all diabetic patients of both types (Type I DM and Type II DM) attending those diabetic clinics who accepted to join the research and gave both oral and written consents, of both sexes, age >18 years old, had been diagnosed diabetic for more than one year of illness duration. Exclusion criteria: a known mental illness patient before the diagnosis of diabetes; a patient with less than one year of illness duration; a catastrophic complication from other diseases; physical and/or mental conditions that interfere with participation; and patients with gestational diabetes. The data collected by interview using a standard questionnaire consisted of two parts: Part one is self-administered, such as the personal data, clinical factors, clinical complications, and lifestyle to explain depression: socio-demographic (age, gender, marital status, level of education, occupation, and residence), smoking habits, characteristics of the disease (type, duration, and type of treatment), complications (retinopathy, neuropathy, nephropathy, and sexual dysfunction for males), and comorbid conditions or diseases (hypertension, ischemic heart disease, asthma, and thyroid disease). Part two used a Patient Health Questionnaire-9 (PHQ-9) 9-item screening questionnaire comprising questions used to screen for depression; it has been validated for use in primary care [9]. The Arabic translation of the Patient Health Questionnaire-9, the Tunisian version, is used [10]. The PHQ-9 questions are based on the diagnostic criteria for depression in the DSM-IV [11]. And ask about the patient's experience in the last 2 weeks. As regards the severity of depression, scores range from 0 to 27. The scores on the PHQ-9 are used to determine the baseline severity of the disease [12]. PHQ scores with 5, 10, 15, and 20 cut-off points represent mild, moderate, severe, and severe depression, respectively [13]. Cutoff of PHQ-9 scores of ≥ 5 for prevalence estimates for screened depression and a score of ≥ 10 for cost-analysis estimates of those who may require treatment [14]. Overall, the prevalence of depression is measured by the cutoff score of ≥10, which is the most widely used to indicate positive cases of depression [15-17] and the need for medical treatment [14], depending on the following score ranges: 1-4 minimal depression, 5-9 medium, 10-14 moderate, 15-19 moderate to severe, and 20-27 severe.

The data is plotted in the software program "SPSS version 25 into a descriptive statistic, mean, ± standard deviation, count, percent, and graph presentation and is analyzed by a chi-square test and a one-way ANOVA test used to compare between the variables. The P value is considered significant if it is less than 0.05, and a 95% CI was calculated to determine the association.

Results

A total of 400 diabetic Libyan patients participated in this study; their distribution by sociodemographic and DM characteristics and co-morbid conditions is shown in Tables 1-2. The study sample includes 148 (37%) males and 252 (63%) females, and the diabetic patients' ages ranged from 22 to 65 years old. Patients' lifestyles are shown in Table 3. Table 3 indicates that most of the participants

are non-smokers (304 (76%), 11% of diabetic patients are very committed to diet control as a part of diabetes mellitus management, 21.8% of diabetic patients have regular exercise (at least 30-minute walking), and 49.5% do not have a sleep disturbance.

Character	Frequency	Percentage
Age:		
< 35 years	22	5.5%
35 to < 55 years	178	44.5%
≥ 55 years	200	50%
Gender:		
Male	148	37%
Female	252	63%
Marital status:		
Married	311	77.8%
Single	36	9%
Divorce	12	3%
Widow	41	10.2%
level of education:		
Illiterate	65	16.3%
Primary to preparatory	132	33%
Secondary school	106	26.5%
University	77	19.3%
Postgraduate	20	5%
Accommodation type:		
Owner	328	82%
Renter	24	6%
Internal displacement	48	12%
Current occupation:		
Unemployment	13	3.3%
Housewife	166	41.5%
Governmental employee	145	36.3%
Non-governmental work	38	9.5%
Retired	38	9.5%
Number of family members:		
≤ 3	72	18%
4 to 6	134	33.5%
7 to 9	122	30.5%
≥ 10	72	18%
Family monthly income:		
< 500LD	158	39.5%
500 to < 1000LD	169	42.3%
1000 to < 3000LD	64	16.0%
≥ 3000LD	9	2.2%

Table 1: The socio-demographic character of the diabetic patients.

Clinical character	Frequency	Percentage
Previous psychiatric disease:		
Yes	0	0%
No	400	100%
Diabetes mellitus duration:		
≤ 3 years	85	21.2%
4 - 9 years	115	28.7%
10 - 19 years	131	32.8%
≥20 years	69	17.3%
Diabetes drug treatment type:		
Pills	153	38.2%
Insulin	236	59%
No drug treatment	11	2.8%
Diabetes drug adherence:		
Not committed	37	9.2%
Sometimes	52	13%
Often	131	32.8%
Very committed	180	45%
Diabetes complication:		
Yes	244	61%
No	156	39%
Diabetes complication type:		
No complication	156	39%
Eye complication	137	34.2%
Peripheral neuropathy	86	21.5%
Kidney complication	5	1.3%
Others	16	4%
Comorbidity:		
Yes	195	48.8%
No	205	51.2%
Other diseases		
No disease	205	51.1%
Hypertension	139	34.8%
Heart problem	11	2.8%
Thyroid disease	15	3.8%
Others	30	7.5%

Table 2: The Clinical character of the diabetic patient under the study.

Lifestyle Character	Frequency	Percentage
Smoking:		
No smoking	304	76%
Cigarettes smoker	50	12.5%
Shisha smoker	2	0.5%
Ex-smoker	44	11%
Diet control:		
Not committed	184	46%
Sometimes	172	43%
Very committed	44	11%
Physical activity:		
Regular	87	21.8%
Irregular	182	45.5%
Sometimes	131	32.7%
Sleep disturbance:		
Yes	71	17.8%
Sometimes	131	32.7%
No	198	49.5%
Body weight changes:		
No	195	48.7%
Increase	72	18%
Decrease	133	33.3%

Table 3: Lifestyle character of the diabetic patient under the study.

The distribution of depression using a Patient Health Questionnaire-9 (PHQ-9) cut-off score ≥ 10 among diabetic primary health care patients in 2020 reveals 122 (30.5%), which indicates approximately one-third classified depressed diabetic patients as having moderate to severe depression who need medical intervention (Figure 1). In the remainder of the study sample, 278 (69.5%) were classified as undressed diabetic patients (Figure 1).

A cross-classification of patients with and without depression by socio-demographic and DM characteristics and co-morbid conditions is shown in Table 4. The prevalence of depression is highest among the group aged 36-55 years (50.8%) and lowest among those aged >35 years (5.7%). No statistically significant relationship exists between age and depression proportion (P = 0.220). Females had a significantly higher proportion of depression (73%) compared to males (27%) (P = 0.006).

Depression is significantly higher among currently married (68.9%) than single (11.5%) patients (P = 0.011). Unemployed patients also have a significantly higher prevalence of depression (42.0%) than employed patients (29.3%) (P = 0.013).

The prevalence of depression is not statistically significant throughout the level of education (P = 0.373), smoking status (P = 0.333), number of family members (P = 0.479), and monthly incomes from 1000LD to <3000LD and ≥ 3000LD, 15.6% and 2.5%, respectively.

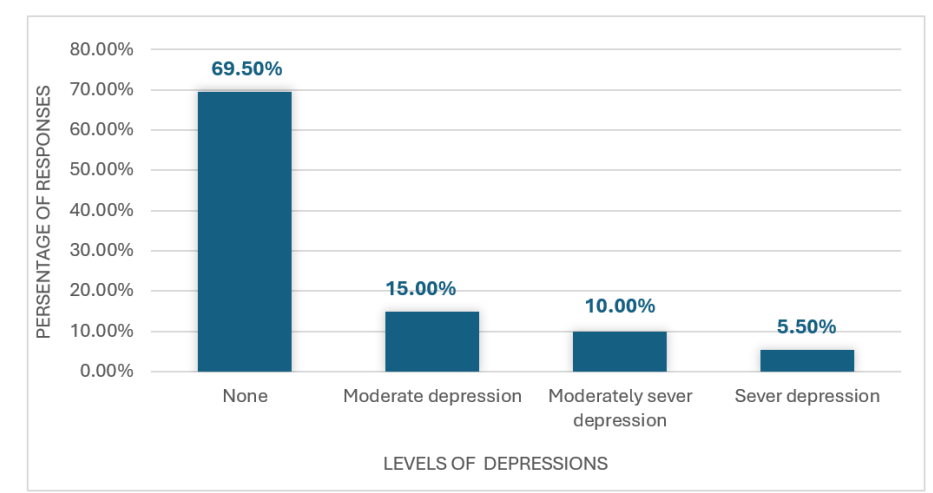

Figure 1: Distribution severity of depression among diabetic primary health care patient 2020 by using PHQ9 cut-off score ≥ 10.

Socio-Demographic Character	Depression Symptom Proportion	P Value**	Mean PHQ9 Score	P Value*
Age:				
≤ 35 years	5.7%		7.73	
36 to 55 years	50.8%	0.212	8.02	0.220
≥ 55 years	43.5%		6.88	
Gender:				
Male	27.0%	0.006	5.75	0.000
Female	73.0%		8.42	
Marital status:				
Married	68.9%		6.89	
Single	11.5%	0.036	8.58	0.011
Divorce	4.1%		10.75	
Widow	15.5%		9.56	
Level of education:				
Illiterate	14.8%		7.58	
Primary to Preparatory	35.2%	0.373	7.85	0.182
Secondary school	30.3%		8.02	
University	13.9%		5.84	
Postgraduate	5.8%		7.15	
Accommodation type:				
Owner	70.5%		6.65	
Renter	7.4%	0.000	9.88	0.000
Internal displacement	22.1%		11.54	
Current occupation:				
Unemployment	4.9%		9.54	
Housewife	42.6%	0.528	7.95	0.183
Governmental employee	36.1%		7.14	
Non-governmental work	9.8%		7.50	
Retired	6.6%		5.50	
Number of family members:				
≤ 3	20.5%		7.88	
3 to 6	31.1%		6.87	
7 to 9	33.6%	0.479	8.24	0.226
≥ 10	14.8%		6.65	
Family monthly income:				
< 500LD	40.1%	0.994	7.72	0.821
500 to < 1000LD	41.8%		7.23	
1000 to < 3000LD	15.6%		7.45	
≥ 3000LD	2.5%		6.00	
Primary care center:				
Tajoura	18%		7.16	
Souq aljuma	19.7%	0.535	7.30	0.708
Tripoli center	23.8%		8.14	
Abu salium	16.4%		6.79	
Qaser ben ghashier	22.1%		7.76	

Table 4: Socio-demographic factors associating the depression proportion and its severity.

* A NOVA test - ** Chi square test.

The mean PHQ9 score for all groups is nearly the same, around 7, and there is no statistically significant relationship (P = 0.821). The frequency of depression among diabetic primary care patients who attend Tripoli municipality is 23.8%, which is the highest in all primary care centers and is not statistically significant (P = 0.708). The clinical factors and lifestyle associated with the depression proportion and its severity are mentioned in Tables 5-6. The prevalence of depression is highest among those who have DM complications (76.2%) and is significantly associated with depression (P = 0.000). The main frequency of depression among diabetic Libyan patients who have diabetes eye complications were 44.3%, followed by peripheral neuropathy, kidney complications, and others, which were 28.7%, 2.5%, and 4.1%, respectively. The proportion of depression among diabetic patients who had other comorbid conditions (thyroid diseases or asthma) is 53.3%, which is significant (P = 0.02). While among those on insulin ± OHA (64.8%), those on OHA alone (33.6%) (P = 0.251) There is no statistically significant relation between diabetes mellitus duration, depression proportion, and its severity among diabetic patients (P = 0.909).

Clinical Character	Depression symptom rate	P value**	Mean PHQ9 score	P value*
Diabetes mellitus duration:				
≤ 3 years	23.0%	0.581	7.81	0.909
4 - 10 years	24.5%		7.44	
10 - 19 years	36.1%		7.15	
≥20 years	16.4%		7.46	
Diabetes drug treatment type:				
Pills	33.6%	0.251	7.16	0.633
Insulin	64.8%		7.66	
No drug treatment	1.6%		6.27	
Diabetes drug adherence:				
Non-committed	15.6%	0.000	10.22	0.000
Sometimes	21.3%		10.00	
Often	27.9%		6.85	
Very committed	35.2%		6.53	
Diabetes complication:				
Yes	76.2%	0.000	8.51	0.000
No	23.8%		5.74	
Diabetes complication type:				
No complication	20.5%	0.000	5.74	0.000
Eye complication	44.2%		8.64	
Peripheral neuropathy	28.7%		8.64	
Kidney complication	2.5%		10.40	
Others	4.1%		6.13	
Comorbidity:				
Yes	53.3%	0.230	8.15	0.027
No	46.7%		6.74	
Other disease name				
No disease	46.7%	0.463	6.74	0.156
Hypertension	37.7%		8.04	
Heart problem	4.1%		9.91	
Thyroid disease	4.9%		9.43	
Others	6.6%		7.47	

Table 5: Clinical factors associated with the depression proportion and its severity.

* A NOVA test - ** Chi square test.

Character about Lifestyle	Depression Symptom Proportion	P value**	Mean PHQ9 score	P value*
Smoking:				
No smoking	80.3%	0.333	7.77	0.114
Cigarettes Smoker	12.3%		7.32	
Shisha smoker	0.2%		7.00	
Previous smoker	7.2%		5.25	
Diet control:				
No committed	62.3%	0.000	8.77	0.000
Sometimes	32.8%		6.71	
Very committed	4.9%		4.66	
Physical activity:				
Regular	18.0%	0.013	5.91	0.003
Irregular	56.6%		8.57	
Sometimes	25.4%		6.85	
Sleep disturbance:				
Yes	38.5%	0.000	13.31	0.000
Sometimes	40.2%		8.95	
No	21.3%		4.32	
Body weight changes:				
No	36.1%	0.003	6.41	0.007
Increase	22.1%		8.36	
Decrease	41.8%		8.43	

Table 6: Lifestyle factors associated with the depression proportion and its severity.

* A NOVA test - ** Chi square test.

In this study, the result shows that most diabetic primary care patients who did not commit to their drug were depressed by 15.6%, and there is a statistically significant relationship between diabetic drug adherence and depression symptoms (P < 0.0001). The frequency of depression among non-smoker patients is 80.3%, while among cigarette-smoker patients it is 12.3%. The mean PHQ9 score is 7.77 for non-smoking patients and 7.32 for cigarette smokers, and there is no statistically significant relationship (P = 0.114) (Table 6). The proportion of depression among diabetic patients who were not committed to diet control is 62.3%, while the rate of depression among diabetic patients who are sometimes very committed to diet control is 32.8% and 4.9%, respectively. The mean PHQ9 scores for diabetic patients who were not, sometimes, or very committed to diet control were 8.77, 6.71, and 4.66, respectively; a statistically significant relationship exists (P < 0.0001) (Table 6). The frequency of depression among diabetic patients who had regular exercise (at least 30 minutes walking) as part of diabetes mellitus management is 18%, and irregular and sometimes physical activity is 56.6% and 25.4%, respectively. The mean PHQ9 score for diabetic patients who regularly, irregularly, and sometimes exercise is 5.91, 8.57, and 6.85, respectively; a statistically significant relationship exists (P = 0.003) (Table 6). The proportion of depression among participants who sometimes had sleep disturbance is 40.2%, which is the highest, while the proportions of participants who had sleep disturbance and no sleep disturbance are 8.5% and 21.3%, respectively. The mean PHQ9 score for participants with sleep disturbance, sometimes, and no sleep disturbance was 13.31, 8.95, and 4.32, respectively; statistical significance exists (P < 0.0001) (Table 6).

The frequency of depression among diabetic Libyan patients who had a decrease in body weight is 41.8%, while the patients with

no body weight changes and increased body weight proportions are 36.1% and 22.1%, respectively. The mean PHQ9 score for diabetic patients with no body weight changes, increased body weight, and decreased body weight were 6.41, 8.36, and 8.43, respectively; there is a statistically significant relationship (P = 0.007) (Table 6). The frequency of depression among diabetic primary care patients who had no thoughts about death (self-harm) during the last two weeks of their lives is 32.8%, which is the highest among the depressed diabetic patients. The proportion of depression among diabetic patients who had several times, more than half of the day, and everyday thoughts about death (self-harm) during the last two weeks of their lives were 25.4%, 23.88%, and 18%, respectively. The mean PHQ9 score for a diabetic patient who had none, several times, more than half of days, and everyday thoughts about death (self-harm) during the last two weeks of their life were 5.01, 10.36, 16.07, and 19.59, respectively. There is a statistically significant relation between self-harm thoughts and depression proportion and its severity (P < 0.0001) (Table 7).

Character	Depression Symptom Proportion	P Value**	Mean PHQ9 Score	P Value*
Self-harm ideation:				
None	32.8%	0.000	5.01	0.000
Several times	25.4%		10.36	
More than half of days	23.8%		16.07	
Every day	18.0%		19.59	
Difficulty with these problems to deal with ordinary life:				
Not Difficult at All	10.7%	0.000	3.78	0.000
Somewhat Difficult	34.4%		10.07	
Very Difficult	41.0%		16.18	
Extremely Difficult	13.9%		22.41	

Table 7: Factors associated with depressive symptoms proportion and its severity (N = 400).

* A NOVA test - ** Chi square test.

The frequency of depression among diabetic patients who have felt difficulty dealing with ordinary life because of psychological issues is 41%, which is higher than the proportions among other depressed diabetic patients. The proportion of depression among diabetic patients who felt it was not difficult, sometimes difficult, or extremely difficult to deal with ordinary life is 10.7%, 34.4%, and 13.9%, respectively. The mean PHQ9 score for a diabetic patient who had felt not difficult at all, sometimes difficult, very difficult, or extremely difficult to deal with ordinary life was 3.78, 10.07, 16.18, and 22.41, respectively. There is a statistically significant relationship between the difficulty in dealing with ordinary life because of psychological issues and the depression proportion and its severity among participants (P < 0.0001) (Table 7).

The proportion of depressed diabetic patients who had no self-harm ideation is 32.8%, while the proportion of depressed diabetic primary care patients who had self-harm ideation is 67.2%. The proportion of depression among diabetic patients who had several times, more than half of days, and everyday thoughts about death (self-harm) during the last two weeks of their lives were 25.4%, 23.8%, and 18%, respectively. There is a statistically significant relation between self-harm thoughts and depression proportion and its severity (P < 0.0001) (Table 7).

Discussion

The prevalence of depression among DM patients in Tripoli, Libya, was found to be 35.5%, which is close to the figures reported in a few neighboring countries. For instance, in Tunisia, Ellouze F, Damak R., *et al*. reported that the prevalence of depression in T2DM was 38% in 2017 [18]. Tunisia has conditions like Libya's due to the instability after revolutions. Another neighboring country is Morocco, reported by Bensbaa., *et al*. (2014), which also has a high de-

portation prevalence of depression of 33.1% [16]. Comparing the result of our study to other studies around the world, the prevalence of depression among DM patients in Tripoli, Libya, was in the range of other results. For instance, in Makkah City in Saudi Arabia, it was 20.68% [17], in Jordan, it was 19.7% [19], in Pakistan, it was 43.5% [9], in Palestine, it was 40% [20], in Nigeria, it was 19.4% [21], and 27.5% [22], in Addis Ababa, Ethiopia, it was 13-61% [23], and in Turkey, it was 37% [19], in Mexico, it was 48.27% [21], in China, it was 56.1% [24], and in Spain, it was 40% [25]. In addition, a meta-analysis of 42 studies found that approximately 20-40% of individuals with T2DM have comorbid depression, a prevalence at least double that found in the general population in 2013 [21]. In Uganda, Akena D. and Kadama found that the association between depression and diabetes mellitus was 28% [22].

As regards the severity of depression, when a cut-off score of PHQ 9 ≥ 5 was used, about 26.25% of the studied participants had mild depression, 15%, 10%, and 5.5% had moderate, moderately severe, and severe depression, respectively.

The severity of depression among the DM patients in Tripoli, Libya, when a cut-off score of PHQ 9 ≥ 5 falls in the range of other results around the world, For instance, in Ethiopia, 28.4% of diabetic patients fulfilled the criteria for mild depression, 12.1% for moderate depression, 2.7% for moderately severe depression, and 1.5% for severe depression [26]. In Makkah, Saudi Arabia, the prevalence of depression was 35.60%, 12.83%, 7.07%, and 0.79% having mild, moderate, moderately severe, and severe depression, respectively [17]. In Egypt, depressive symptoms were 23.3% for mild depression, 11% for moderate depression, and 1.3% for moderately severe to severe depression [9].

In the same context, the closest results to our study were found in a study from Rwanda, with 28%, 21.2%, 11.5%, and 6.4% mild, moderate, moderately severe, and severe depression, respectively [27]. The unstable conditions after the revolution and civil war in Libya and Rwanda were similar.

The current study didn't show a significant relationship between depression and being older. Similar results were noted from several other studies that reported no association between age and the prevalence of depression among patients [9,17], whereas in contrast, results from a study in Palestine [28], Dubai [29], and China [24] revealed a significant association between age and depression and diabetes. A significant relationship between depression and the female gender was found. A similar relation was reported in many studies, such as in Dubai [14,29,30] and Palestine [26,28], whereas in contrast, results were found in Mexico [31] and in another study [9]. This sex difference could be because of lifestyle differences. Marital status was significantly associated with depression in the current study, which was supported by a study from Malaysia that concluded that the majority of depressed diabetic patients were married [32]. While a study in Morocco showed that depression was more prevalent among unmarried diabetics [16,33].

This study found no significant relationship between depressive symptoms and educational level or occupation, which supports other studies [9,14,17,31,34], respectively. In contract, these studies were in disagreement with other studies worldwide that found a significant relationship with education level [14,17,19,28,29] and occupation [35], respectively.

In addition, accommodation type (residency status) was significantly associated with depressive symptoms and severity rate. About an internally displaced patient because of the Civil War. This led many Libyan families to leave their housing in war areas, exposing their homes and belongings to the risk of theft by militias, gangs, and destruction by rockets and bombs, which induced great mental stress. This can explain the significant association between internal displacement and the severity of depressive symptoms. A similar relationship was reported in many studies [36]. This disagrees with other studies reported worldwide [37].

In this study, no significant relationship between depressive symptoms and the number of family members, family monthly income, duration of diabetes mellitus, or diabetes treatment type was found. However, other studies in Libya have found that an increase in the family size and crowded living environment caused depression and increased socioemotional problems among households [38,39].

In previous studies, depression was found to be a consistent and potentially modifiable predictor of diabetes medication-taking behavior [28]. It also found that treatment adherence among individuals with diabetes and depression indicated that there was a significant relationship between depression and treatment nonadherence [28]. Those are consistent with research findings show-

ing a strong association between drug adherence and depressive symptoms, which were reported in many studies [19,33,47] but dissimilar in others [17,29]. A significant relationship between depression and diabetic complications was also found. A similar relationship was reported in many studies [24,31,32].

In the present study, the complications of diabetes are associated with depression. Diabetes complications such as eye complications, peripheral neuropathy [35,44], nephropathy [17], and others such as sexual dysfunction [44], atherosclerotic cardiovascular, peripheral arterial, and cerebrovascular complications may increase susceptibility to depression [24].

The current study showed that depression severity was higher among patients with comorbidity and more among hypertension [17], in contrast to heart problems, thyroid disease, and others such as asthma, COPD, rheumatoid arthritis, Crohn's disease, colon cancer, and breast cancer. But the relation wasn't statistically significant [17,26,29,40,41], in contrast to findings from a previous study that observed that patients with comorbidity were found to be risk factors for developing depression among diabetic patients [28]. There is a similarity between the results of our research and other research that showed no significant association between smoking and depression in diabetic patients [24,28,29,41,42].

Management guidelines for diabetes mellitus emphasize the significance of medication adherence, physical activity, diet, and self-monitoring of blood glucose [28]. This study found that diet control was significantly associated with depression, which is consistent with the findings reported by other studies. [32,43] where others stated a non-significant association [17].

Because of the increased release of endorphins and brain neurotransmitters during exercise, physical activity is known to have protective physiological effects on depression and serve as a buffer against the development of psychological illness [34]. In this study, physical inactivity was also found to be associated with depression, which is consistent with the findings reported by other studies [24,25,35,44], whereas in contrast [17].

A significant relationship between depression and weight changes was found. A similar relationship was reported in many studies worldwide [45]. The results provide evidence that diabetic patients with depressive symptoms can experience sleep disturbances, which is consistent with the findings reported by other studies [14,24,45]. Poor sleep quality may be more common in diabetic patients with depressive symptoms.

There were 27.8% of the diabetic primary care patients attending diabetic clinics in the primary health care centers found to have suicidal ideation (self-harm ideation). Suicidal ideation and suicidal attempts are more frequent among diabetic patients when compared to the general population. In one study, it was reported that depression was the most common psychiatric disorder encountered among patients who attempted suicide [46].

Furthermore, various observational studies reported that the prevalence of suicidal ideation among diabetic patients was 15% in type 1 DM and 9.4% in type 2 DM in Canada, 24.2% in Korea, 11.0% in the Netherlands, 9.2% in the USA, and 13.1% in Brazil [45-48]. A systematic review and meta-analysis conducted to evaluate the risk of depression and suicidality among diabetic patients. Found that the prevalence of suicidal ideation among patients with diabetes was 16.2% reported in 2018 [51]. Another study in Nigeria, reported by Igwe MN, Uwakwe R., *et al*. reported that, proportionally, the subjects with diabetes mellitus exhibited suicidal ideation, plan, and attempt (6.3%) in 2013 [52].

These findings were in agreement with this study, which reported that subjects with diabetes mellitus showed greater hopelessness and suicidal ideation but a lower rate.

The high rate of self-harm ideation in our study may contribute to the extraordinary situation of Libyan people living during the study due to the civil war and the COVID-19 outbreak. Thus, assessment of self-harm ideation is essential when screening for depression, as it can potentially reduce fatal outcomes.

Conclusion

More than 30 percent of diabetic patients had depression. The female has a higher prevalence of depression. The maternal state, type of treatment, and presence of other comorbid conditions or complications were significant risk factors.

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