

PREVALENCE OF DEPRESSION AMONG TYPE II DIABETIC PATIENTS AT IMAM
AL-HASAN CENTER IN KARBALARusul Lutfi Ismaee^{*1}, Anwer Hameed Rashid², Mohammed Ridha Warwar³¹M.B.CH.B.²M.B.CH.B.;F.I.B.M.S (F.M)³M.B.Ch.B - F.I.C.M.S (Psych.)

Article Received: 28 June 2026

Article Revised: 18 July 2026

Article Published: 01 Aug. 2026

***Corresponding Author: Rusul Lutfi Ismaee**

M.B.CH.B.

DOI: <https://doi.org/10.5281/zenodo.21702450>**How to cite this Article:** Rusul Lutfi Ismaee^{*1}, Anwer Hameed Rashid², Mohammed Ridha Warwar³. (2026). Prevalence Of Depression Among Type II Diabetic Patients At Imam Al-Hasan Center In Karbala. World Journal of Advance Healthcare Research, 10(8), 96–105.

This work is licensed under Creative Commons Attribution 4.0 International license.

ABSTRACT

Introduction: Type 2 diabetes mellitus is a condition marked by a non-autoimmune, heterogeneously progressive loss of sufficient insulin production from islet β cells, often accompanied by metabolic syndrome and insulin resistance. Depression is a mood disorder characterized by a persistent absence of interest. Depression is a prevalent comorbidity of type 2 diabetes mellitus. The International Prevalence and Treatment of Diabetes and Depression study determined that the prevalence of major depressive disorder in patients with Type 2 diabetes mellitus was approximately 10.6%. **Method:** A cross-sectional study conducted at Imam Al-Hasan Center for Endocrinology and Diabetes in Karbala City, Iraq, over a period from April 1, 2025, to June 30, 2025. A total of 350 patients with Type 2 Diabetes Mellitus (T2DM) were included in the study. **Results:** The present study included a total of 350 diabetic patients. The mean age of the participants was 56.35 ± 10.40 years. (71%) of study participants scored high for depression. Severe and Moderately severe was about half of the participants, (23%) showed Moderate severity and 20% showed Mild severity, while 9% had no depression. Female participants ($p=0.015$), housewives occupation ($p=0.025$), good income ($p=0.008$), Diabetes Complication ($p<0.001$) increased mean HbA1c ($p=0.023$), all had significantly higher Mean Depression Scores. **Conclusion:** Approximately 71 % of type 2 diabetic patient show signs of potential depression. Nearly half of them exhibited severe depression. The study identified significant associations between depression severity and several variables including gender, occupation, income, HbA1c level, presence of diabetic complications, comorbid diseases, and elevated stress levels. Female patients, housewives, individuals with lower income, those with poor glycemic control, and patients suffering from complications or comorbidities had significantly higher depression scores.

KEYWORDS: Type 2 diabetes mellitus, major depressive disorder, depression Iraq, Karbala City.

INTRODUCTION

Diabetes mellitus encompasses several types, including Type 1 diabetes (T1D), Type 2 diabetes (T2D), gestational diabetes mellitus, and other less common forms. All are characterized by hyperglycemia of varying origins. T2D is defined by a non-autoimmune, heterogeneously progressive loss of adequate insulin production from pancreatic islet β -cells, often accompanied by insulin resistance (IR) and features of metabolic syndrome (MS).^[1] Diabetes is thought to be the eighth greatest cause of death and disability, and its

high incidence, disability, and mortality have made it a global health burden.^[2]

Depression is a mood disorder characterized by a persistent absence of interest and feelings of melancholy.^[3] The 2021 International Diabetes Federation data indicates that the global incidence of diabetes is 10.5% and is projected to rise to 12.2% by 2045.^[1] This makes it one of the fastest-growing global significant health events of the 21st century. Depression is a prevalent comorbidity of type 2 diabetes mellitus (T2DM). The International Prevalence and Treatment of

Diabetes and Depression (INTERPRET-DD) study determined that the prevalence of major depressive disorder (MDD) in patients with T2DM was approximately 10.6%.^[4]

A number of clinical studies have demonstrated that depression enhances the risk of T2DM^[5] and that T2DM also increases the risk of depression.^[6] Additionally, a more severe form of depression is associated with a higher risk of T2DM.^[6]

In the Middle East, the prevalence of depression in people with type 2 diabetes mellitus ranges from 17% to 74.4%. The UAE has the lowest prevalence of depression, whereas Egypt has the highest.^[7]

This study aims to determine the prevalence of depression among patients with type II diabetic mellitus in city of Karbala, to examine the association between socio-demographic characteristics and depression levels among patients with type 2 diabetes mellitus and to assess the relationship between diabetes-related complications and the severity of depression in patients with type 2 diabetes mellitus.

PATIENTS AND METHODS

Study Design, Setting, and Duration

This is a cross-sectional study conducted at Imam Al-Hasan Center for Endocrinology and Diabetes in Karbala City, Iraq, over a period from April 1, 2025, to June 30, 2025.

Study Population and selection

A total of 366 patients with Type 2 Diabetes Mellitus (T2DM) were approached, 13 patients refused to participate and 3 patients didn't finish the interview so they were excluded from the study, the final number of cases was 350 patient with 95.6% response rate.

Inclusion and Exclusion Criteria

- **Inclusion criteria:** patients of both sexes, aged >30 years, diagnosed with Type 2 Diabetes Mellitus for at least 6 months, able to provide informed consent and complete the questionnaire.
- **Exclusion criteria:** patients on medications other than those specified for T2DM, and patients currently taking antidepressants, patient with type 1 DM and pregnant women.

Data Collection Method

Data was collected through direct interviews using a semi-structured questionnaire.^[8] Each interview lasted approximately 10–15 minutes, with data collection occurring 2–3 days per week, for 3–4 hours per session.

The questionnaire consisted of three sections:

1. Personal and socio-demographic data: age, sex, job, residence, education level, marital status, smoking status, income, and employment.
2. Clinical information: duration of T2DM, type of medication (oral hypoglycemics or insulin), HbA1c

level, presence of comorbidities or complications, and family history of diabetes.

3. Depression assessment: the PHQ-9 questionnaire was used to identify depressive symptoms.^[9]

Diagnostic Criteria

Type 2 Diabetes Mellitus (T2DM) was diagnosed based on American Diabetes Association (ADA)^[10] guidelines by a physician or endocrinologist. The diagnosis required at least two of the following:

Symptoms of polyuria and polydipsia;

Random blood glucose level ≥ 200 mg/dL (11.1 mmol/L);

Fasting blood glucose level ≥ 126 mg/dL (7.0 mmol/L);

2-hour postprandial glucose ≥ 200 mg/dL (11.1 mmol/L) after 75g glucose load.

Depressive disorder was diagnosed using the PHQ-9 questionnaire, administered via clinical interview.^[9]

The 9 Items of PHQ-9^[11]

1. Little interest or pleasure in doing things (Anhedonia)
2. Feeling down, depressed, or hopeless (Depressed mood)
3. Trouble falling or staying asleep, or sleeping too much (Sleep disturbance)
4. Feeling tired or having little energy (Fatigue)
5. Poor appetite or overeating (Appetite changes)
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down (Feelings of worthlessness or guilt)
7. Trouble concentrating on things, such as reading the newspaper or watching television (Concentration difficulties)
8. Moving or speaking so slowly that other people could have noticed. Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual (Psychomotor agitation or retardation)
9. Thoughts that you would be better off dead or of hurting yourself in some way (Suicidal ideation)

Each item is scored from 0 to 3^[11]

0 = Not at all

1 = several days

2 = More than half the days

3 = nearly every day

• Severity categories commonly used^[11]

0–4: None/minimal

5–9: Mild

10–14: Moderate

15–19: Moderately severe

20–27: Severe depression

Pilot Study

A pilot study was conducted in March 2025 with 20 participants to assess the clarity of the questionnaire and estimate the average time required for completion. Participants took approximately 10–15 minutes to

complete the form. No changes were made to the questionnaire following the pilot, and data from the pilot study were excluded from the final analysis.

Ethical Considerations

Ethical approval for the study was obtained from the Ethics Committee at Imam Al-Hasan Center. All eligible participants provided written informed consent before participation. Patients who scored high for depression were referred to the nearest psychiatric unit for appropriate treatment and follow-up.

Sample size calculation

The following equation was used to calculate the sample size.

$$n = z^2 \cdot p \cdot q / d^2$$

n = Sample

z = Size, 1- α /2 percentile of a standard normal distribution 1.96

d = Absolute precision=0.05

p = Expected proportion= 32.2%.^[12]

q = 1-p.

The minimum estimated sample size was 350 patients.

Statistical analysis

Data were entered and analyzed throughout the use of the Statistical Package for the Social sciences (SPSS 23.0 for Windows). Descriptive statistics presented as frequency and percentage (or mean $\pm$ SD) in appropriate tables and graphs. Possible association between the study variables was tested using T-test or ANOVA test. Significance level was considered if $p < 0.05$.

RESULTS

The present study included a total of 350 diabetic patients. The mean age of the participants was 56.35 ± 10.40 years. About two thirds of the participants were female. More than one half of the participants had primary education or read and write. Majority of the participants reported urban residence. Housewives and Unemployed/Retired accounted for more than three quarters of the total participants (78.6%), while employed accounted for 21.4%. more than one half reported average or good monthly income. Smoking was reported by 21.7% of the total study sample whereas 5.4% of the total was Ex-smoker. Family History of Diabetes was reported by more than two thirds of the study sample (table-1).

Table 1: Socio-demographic characteristics among study participants.

Characteristics		Number (%) N=350
Age (years)	Mean $\pm$ SD	56.35 $\pm$ 10.40
Sex	Male	131 (37.4)
	Female	219 (62.6)
Marital status	Married	331 (94.6)
	Single/Widow	19 (5.4)
Education	Primary/Read & write	208 (59.4)
	Secondary school	107 (30.6)
	University	35 (10)
Occupation	Employee	29 (8.3)
	Self-employed	46 (13.1)
	Housewife	202 (57.7)
	Unemployed/Retired	73 (20.9)
Residence	Urban	317 (90.6)
	Rural	33 (9.4)
Monthly income	Poor	151 (43.1)
	Average	190 (54.3)
	Good	9 (2.6)
Smoking	Yes	76 (21.7)
	No	255 (72.9)
	Ex-smoker	19 (5.4)
Family History of Diabetes	Yes	251 (71.7)
	No	99 (28.3)

The type of treatment of diabetes was oral tablet in 80% of the study participants, insulin by 11.1% and both treatment in 8.9%. The mean duration of the disease was 9.68 ± 5.84 years and mean BMI was 28.92 ± 5.18 . The mean HbA1c was 8.60 ± 1.73 with more than one half of the study participants had *Good control*, whereas *Poor control* was accounted for 14.9% of the total as illustrated in (table 2) below.

Three quarters of the total participants reported the presence of other diseases apart from diabetes. Hypertension, dyslipidemia and Heart diseases were the main three diseases reported. The most frequent complication reported were Retinopathy followed by Neuropathy and Diabetic foot. Diabetes Complications was reported by 41.7% of study participants. Received

Psychological Support was reported by only 3.4% of the total.

Table 2: Distribution of study group by diabetes characteristics.

Characteristics		Number (%) N=350
Type of treatment of diabetes	Oral	280 (80)
	Insulin	39 (11.1)
	Both	31 (8.9)
Duration of diabetes (years)	Mean $\pm$ SD	9.68 $\pm$ 5.84
HbA1c	Poor control	52 (14.9)
	Under control	119 (34)
	Good control	179 (51.1)
	Mean $\pm$ SD	8.60 $\pm$ 1.73
BMI (kg/m ²)	Mean $\pm$ SD	28.92 $\pm$ 5.18
History of other disease	Yes	260 (74.3)
	No	90 (25.9)
Diabetes Complications	Yes	146 (41.7)
	No	204 (58.3)
Received Psychological Support	Yes	12 (3.4)
	No	338 (96.6)

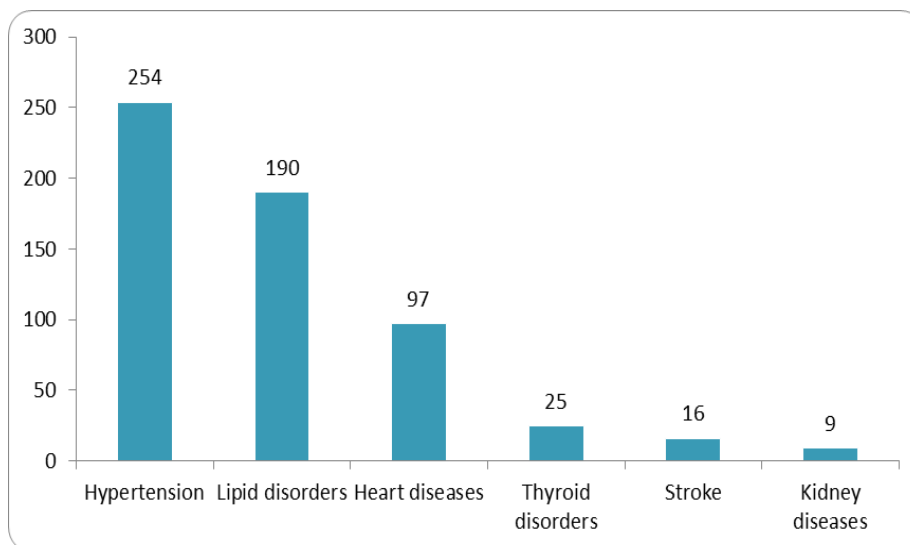


Figure 1: frequencies of other diseases among study participants.

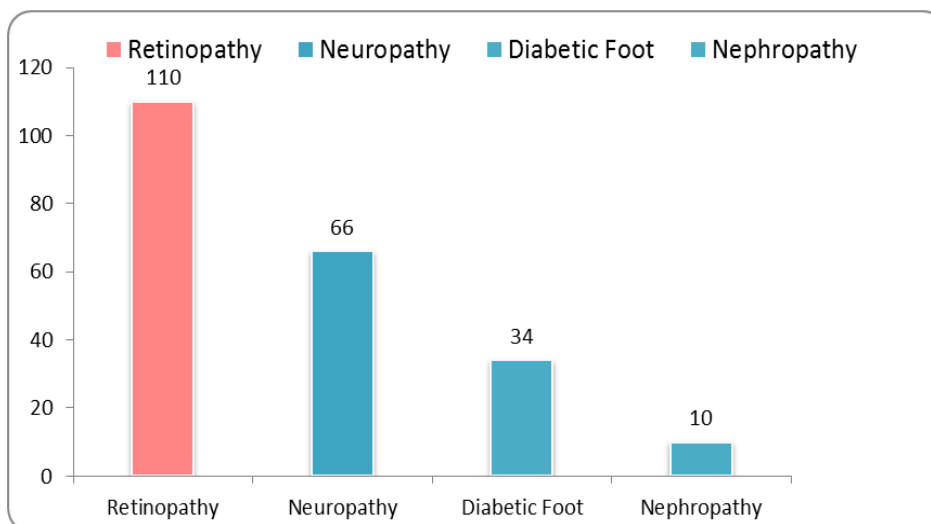


Figure 2: frequencies of complication among study participants.

When the study participants asked about questions regarding assessment of depression severity, about two thirds (71%) of study participants nearly every day or more than half the days had *Little interest or pleasure in*

doing things, Feeling down, depressed, or hopeless, Feeling tired or having little energy, Trouble concentrating on things, such as reading the newspaper or watching television as demonstrated in table 3 below.

Table 3: Frequencies and proportions of answers to questions regarding assessment of depression severity among study participants.

Items in the questionnaire	Choices			
	Not at all	Several days	More than half the days	Nearly every day
Q1: Little interest or pleasure in doing things ⁶³	45 (12.9)	82 (23.4)	102 (29.1)	121 (34.6)
Q2: Feeling down, depressed, or hopeless ⁶¹	44 (12.6)	91 (26)	69 (19.7)	146 (41.7)
Q3: Trouble falling or staying asleep, or sleeping too much	89 (25.4)	91 (26)	57 (16.3)	113 (32.3)
Q4: Feeling tired or having little energy ⁶²	38 (10.9)	92 (26.3)	85 (24.3)	135 (38.6)
Q5: Poor appetite or overeating	132 (37.7)	112 (32)	49 (14)	57 (16.3)
Q6: Feeling bad about yourself – or that you are a failure or have let yourself or your family down	142 (40.6)	86 (24.6)	75 (21.4)	47 (13.4)
Q7: Trouble concentrating on things, such as reading the newspaper or watching television ⁶²	50 (14.3)	83 (23.7)	54 (15.4)	163 (46.6)
Q8: Moving or speaking so slowly that other people could have noticed or being so fidgety or restless that you were moving a lot more than usual	132 (37.7)	105 (30)	77 (22)	36 (10.3)
Q9: Thoughts that you would be better off dead or of hurting yourself in some way	165 (47.1)	66 (18.9)	38 (10.9)	81 (23.1)
Mean Total Severity Score	13.48±5.79 (C.I=12.87-14.09)			

Depression severity among study participants was *Severe* and *Moderately severe* in slightly less than half of the study participants, whereas nearly one quarter (23%)

showed *Moderate* severity and 20% showed *Mild* severity, while 9% classified as *Minimal or no depression* (figure 3).

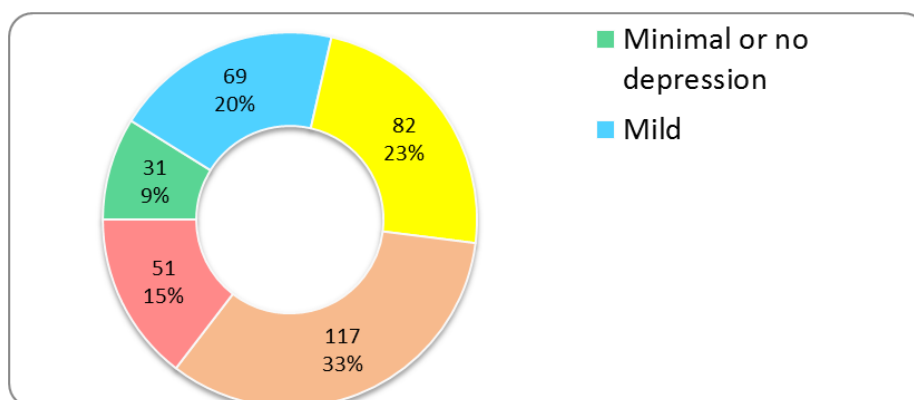


Figure 3: Proportion of depression severity among study participants.

In regard to the association of the socio-demographic characteristics and the *Total Severity Score*, the analysis of data demonstrated that females participants had significantly higher Mean Depression Score than males ($p=0.015$). Housewife occupation had significantly higher Mean Depression Score than other occupation

($p=0.025$). In regard to association of monthly income and the *Total Severity Score* among the study participants, good income had significantly lower mean severity score than poor or average income ($p=0.008$) as showed in table 4.

Table 4: Association of the socio-demographic characteristics and the Total Mean Depression Score.

Characteristics	Categories	Mean Depression Score	P value
Sex	Male	12.50±6.09	0.015*
	Female	14.06±5.53	
Age in years	Pearson's correlation coefficient	0.009	0.863
Marital status	Married	13.52±5.81	0.567
	Single/Widow	12.74±5.52	
Level of education	Primary/Read & write	13.95±5.78	0.138
	Secondary school	13.00±5.61	
	University	12.14±6.18	
Occupation	Employee	11.17±5.83	0.025*
	Self-employed	12.96±5.71	
	Housewife	14.19±5.56	
	Unemployed/Retired	12.74±6.18	
Residence	Urban	13.46±5.78	0.893
	Rural	13.61±5.90	
Monthly income	Poor	14.09±6.04	0.008*
	Average	13.24±5.51	
	Good	8.22±4.47	
Smoking	Yes	14.58±5.63	0.094
	No	13.07±5.80	
	Ex-smoker	14.58±5.74	
* Significant P value of less than 0.05. Independent Samples T- Test or ANOVA test or Pearson's correlation was used.			

In regard to the association of the diabetes characteristics and the *Total Severity Score*, the analysis of data revealed that increased mean HbA1c significantly associated with higher Mean Depression Score

($p=0.023$). The presence of Diabetes Complication was significantly associated with higher Mean Depression Score ($p<0.001$). As showed in table 5.

Table 5: Association of the Total Mean Depression Score and diabetes characteristics.

3.7 Association of the Total Mean Depression Score and diabetes characteristics.			
Characteristics	Categories	Mean Depression Score	P value
Type of treatment of diabetes	Oral	13.15±5.69	0.109
	Insulin	14.64±5.39	
	Both	14.94±6.86	
Duration of diabetes (years)	Pearson's correlation coefficient	0.073	0.175
HbA1c	Pearson's correlation coefficient	0.121	0.023*
BMI	Pearson's correlation coefficient	0.067	0.213
History of other disease	Yes	14.02±5.69	0.003
	No	11.92±5.80	
Diabetes Complication	Yes	14.86±5.48	<0.001*
	No	12.49±5.81	
Received Psychological Support	Yes	14.50±5.40	0.534
	No	13.44±5.80	
* Significant P value of less than 0.05. Independent Samples T- Test or ANOVA test or Pearson's correlation was used.			

DISCUSSION

One of the most prevalent comorbid psychological disorders among people with diabetes is depression. Diabetes-related depression has been linked to poor medication adherence, poor treatment results, unsatisfactory treatment outcome and a decline in quality of life.^[13] Depression enhances the risk of T2DM^{[5][4]} and T2DM also increases the risk of depression.^[6] The focus of our research is depression in diabetes patients, taking into account variables that may contribute to an

increased risk of developing depression. About two thirds (71%) of study participants in our study were depressed, this rate is slightly lower than the prevalence reported in Jordan by **Gharaibeh et al.,(2019)** which was (82.9%).^[14] And in Kufa city (75.78%) by **Al-khaqani et al (2024)**.^[15] and is much higher compared to other studies such as in **Ethiopia** (48.9%) by **Ebrahim et al (2021)**^[15], **Sweileh et al. (2014)** in Palestine, reported that 40% of diabetic patients were potential cases of depression.^[16] **Ferreira et al, (2015),**

Brazil, found that diabetes group had a significantly higher frequency of depression (35.2%) compared to controls (21.1%) with 2.4 times increased risk of depression.^[17] and Saudi Arabia by **Abuhegazy et al (2022)**^[18], reported a prevalence rate of (36.6%).

The current study reported a variation in prevalence rate compared to those in other countries; this could be due to variations in healthcare infrastructure, mental health awareness, social stigma surrounding psychological disorders, as well as differences in the screening tools or diagnostic criteria used in each study.

Regarding the association between age and depression. We didn't find any significant association between age and depression. This finding aligns with a study conducted by **Sweileh et al (2014) in Palestine**, which showed no significant association between depression score and age among diabetic patients.^[16] In contrast to our finding, **Jeong et al, in Korea, 2017** results reported a higher risk in younger age groups, with the highest risk in the youngest age group of the participants (aged 30 to 39).^[19] A German study done by **Chae et al (2023)**, revealed that associations between depression and T2DM risk were stronger in younger age groups, especially those under 34 years.^[20] In Saudi Arabia, **Abuhegazy et al**, found those older than 50 years demonstrated significantly lower risk for developing depression compared to those aged 28-40 years.^[18] on the other hand a Chinese study found that associations between depression and T2DM were stronger among participants aged ≥ 45 years.^[21]

These differences may be attributed to the fact that older adults generally receive stronger family and social support, which provides a protective effect against depression. Additionally, older adults tend to experience fewer financial burdens compared to younger adults, who are often exposed to greater occupational and economic stress. Moreover, the variation in age cut-off points across different studies may contribute to inconsistent findings and limit the ability to make direct comparisons.

Regarding **gender**, about two thirds of the participants in this study were female. Females had significantly higher Mean Depression Score than males ($p=0.015$). this finding agrees with **Sweileh et al (2014) in Palestine**^[16], and an Iraqi study by **Hadi et al (2020)**^[22], and in kufa city by **AL-Khaqani et al (2024)**^[15], in their study, most patients who are potential cases of depression were females.^[16] Research from **Saudi Arabia (2022)** by **Abuhegazy et al (2022)** found that **female gender** was significantly linked to higher rates of depression.^[18]

The reason why females with type 2 DM get depressed more than male could be attributed to hormonal fluctuations which influences neurotransmitter systems linked to mood regulation, while women often experience greater diabetes-related comorbidities such as

obesity and cardiovascular disease, which increases depression risk.^[23]

In terms of **occupation**, we found that being a housewife was significantly associated with depression; this association may be due to factors such as limited social interaction, economic dependence, and household responsibilities. this finding aligns with other studies, for instance, **Sweileh et al** found that participants who were currently jobless were more depressed than the others.^[16] A Pakistani study by **Sana et al (2022)**, on 118 type 2 diabetes patients revealed that significantly more patients with comorbid depression were unemployed compared to those without depression.^[24] A study by **Iarhiagbe et al (2023), in Nigeria**, found a significant association between depression and occupation.^[25]

Regarding **income**, Our study found that good income had significantly lower mean severity score than poor or average income ($p=0.008$). this finding agrees with a study from Karbala city by **Mahan and Mahammad et al (2024)**, found that low income showed a significant relationship with depression risk.^[26] Another study by **Park et al., (2023)** found that low income was a significant risk factor for depression in type 2 diabetic patients.^[27]

Financial stress can make it harder to afford healthcare, medications, and healthy food, which can worsen both diabetes and mental health, leading to poor diabetes control. Additionally, the stress of financial struggles can contribute to feelings of hopelessness and anxiety, making depression more likely.

In this study we found no significant association between depression and the **duration of diabetes**. In contrast to our finding, **Fatima et al (2025)** in Pakistan found that depression severity increased with diabetes duration, especially beyond 13 years.^[28] A Pakistani study conducted by **Sana et al (2022)**, of 102 type 2 diabetes patients found a significant positive correlation between diabetes duration and depression ($p=0.016$).^[24] Research from Ethiopia by **Ebrahim et al (2021)** involving 407 patients showed that duration of diabetes over six years was significantly associated with depression.^[13] A Serbian study by **Šabanović et al, (2019)**, confirmed that diabetes duration more than five years was independently associated with depression.^[29] A Thai study by **Zhang et al. (2023)** found that duration of diabetes ≥ 11 years was an independent risk factor for depression.^[30] The absence of a significant association between depression and diabetes duration in our study may be attributed sample size variation, variations in social support systems across cultures. Also our sample may have included patients who are receiving better diabetes education or psychological support, reducing the impact of disease duration on depression.

The current study shows that higher **HbA1c levels** are significantly associated with higher depression scores

($p=0.023$). Similarly, a study in Karbala city by, **Mahan and Mahammad et al (2024)**,^[26] and An Ethiopian study by **Dukato et al (2024)**^[31] identified a relationship between high HbA1c levels and depressive symptoms. while **Sweileh et al. (2014)** did not find a significant link with glycemic control.^[16] This association could be due to poor self-care behaviors such as irregular medication adherence, unhealthy diet, and reduced physical activity, all of which contribute to poor glycemic control and elevated HbA1c levels. Depression is associated with increased levels of stress hormones like cortisol, which can lead to insulin resistance and hyperglycemia.^[32]

In this study, diabetes **complications** were common in our sample; retinopathy, neuropathy, and diabetic foot were being most frequently reported. We observed a significant association between the presence of complications and higher depression scores ($p<0.001$), as also reported by **Ferreira et al. (2015)** in Brazil and **D'Amato et al. (2016)** in Italy stated that neuropathic symptoms are predictive of depression in T2DM patients.^{[17][33]}

Our study showed no significant association between depression score and **BMI**, this is in contrast with **Sweileh et al (2014) in Palestine**^[16] and), **Mahan and Mahammad et al (2024)**, in Karbala (2023).^[26] Both studies found that patients, who are potentially depressed, had an abnormally high BMI.

The differences in findings between studies could be due to study population, how depression and BMI were measured, or environmental and cultural influences. For example, people in different regions may have different lifestyles, diets, and views on mental health, which could affect the relationship between BMI and depression.

We found that having other **chronic diseases** are significantly associated with depression score, in line with our finding, **Sweileh et al (2014) in Palestine** found that patients who are potentially depressed, had other comorbid diseases beside diabetes.^[16] **Al Maliki et al., in Babel (2014)** found an association with having ihd but not with other comorbidities.^[34] Chronic conditions can cause physical changes in the body that increase the risk of depression and managing multiple health issues can add stress, making patients feel overwhelmed. The impact of these illnesses on daily life, including the need for constant medical care or lifestyle changes, can lead to feelings of frustration or isolation.

The current study found no significant association between depression and smoking, residence, marital status and education level, Type of treatment of diabetes, and Psychological Support. These results show some agreement and some variation across studies depending on populations and methods. For example our finding regarding smoking, disagrees with **Hyassat et al**^[35] and An Ethiopian study by **Dukato et al (2024)**^[31] reported

that smoking increased the odds of depression T2DM patients.

Like our study **Tran et al., Vietnam (2021)**^[36] found no association with residence.

Hyassat et al.,^[35] also found no association with marital status which agrees with our finding in this regard. On the other hand in Saudi Arabia, **Mahalli et al (2015)** found unmarried diabetic patients are more likely to get depressed.^[37]

Our result regarding education is consistent with **Tran et al**^[36] but inconsistent with **Hyassat et al**^[35] and **Zheng et al**^[38] which found that higher education level was associated with less depression.

Tran et al^[36], reported higher rate of depression among untreated patients and those with poor adherence. While specific treatment type (insulin vs oral medication) and depression showed less clear results in these studies.

Unlike our finding, Family and social support were significantly associated with reduced depression risk in T2DM populations (**Hyassat et al**).^[35] Psychological interventions also improve diabetes outcomes and depressive symptoms (**Tran et al.**)^[36]

Our finding regarding smoking disagrees with **Zheng et al.**,^[38] and **Hyassat et al**^[35] which found that depression is more prevalent among smoking diabetic patients.

This study is limited by the small sample size and being conducted at a single tertiary center, which means the results, may not be generalizable to all Type 2 diabetic patients with depression in Karbala Governorate.

CONCLUSIONS

-About two thirds (71%) of type 2 diabetic patients show signs of potential depression. Nearly half of them exhibited severe depression, while the remainder experienced moderate or mild symptoms.

-The study identified significant associations between depression severity and several variables including gender, occupation, income, HbA1c level, presence of diabetic complications, and comorbid diseases.

-Female patients, housewives, individuals with lower income, those with poor glycemic control, and patients suffering from complications or comorbidities had significantly higher depression scores.

Larger tumors were associated with higher histologic grade, and the lungs were the most common site of metastasis, highlighting the need to improve sarcoma care in Iraq.

REFERENCES

1. American Diabetes Association Professional Practice Committee. Standards of Care in Diabetes—2024. Diabetes Care, 2024; 47(1).

2. GBD 2021 Diabetes Collaborators. Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet*, 2023; 402(10397): 203–34.
3. Salik I, Marwaha R. StatPearls. StatPearls Publishing; Treasure Island (FL): Sep 19, 2022. Electroconvulsive Therapy. [PubMed].
4. Zhu M, Li Y, Luo B, Cui J, Liu Y, Liu Y. Comorbidity of Type 2 Diabetes Mellitus and Depression: Clinical Evidence and Rationale for the Exacerbation of Cardiovascular Disease. *Front Cardiovasc Med.*, March 2022; 9: 1–7.
5. Graham EA, Deschênes SS, Khalil MN, Danna S, Fillion KB, Schmitz N. Measures of depression and risk of type 2 diabetes: a systematic review and meta-analysis. *J Affect Disord*, 2020; 265: 224–32. doi:10.1016/j.jad.2020.01.053.
6. Chireh B, Li M, D'arcy C. Diabetes increases the risk of depression: A systematic review, meta-analysis and estimates of population attributable fractions based on prospective studies. *Preventive medicine reports*, 2019; 14: 100822. doi: 10.1016/j.pmedr.20.
7. Sunwar S. Prevalence of Depression in adults with type 2 Diabetes Mellitus in the Middle East countries and the factors associated with it, 2022; 1.
8. Semanya K et al. (2019). Prevalence of depression among patients with type 2 diabetes mellitus: A cross-sectional study using the PHQ-9. *BMC Psych.*
9. Sun Y, Fu Z, Bo Q, Mao Z, Ma X, Wang C. The reliability and validity of PHQ-9 in patients with major depressive disorder in psychiatric hospital. *BMC Psychiatry*, 2020; 20(1): 1–7.
10. American Diabetes Association Professional Practice Committee. Diagnosis and classification of diabetes: Standards of Medical Care in Diabetes—2025. *Diabetes Care.*, Jan. 1, 2025; 48(1,1): S27–S49. doi:10.2337/dc25-S002.
11. Verywell Mind. PHQ-9 Patient Health Questionnaire for Depression. 2023. Available from: <https://www.verywellmind.com/phq-9-patient-healthcare-questionnaire-for-depression-4149685>.
12. Jallo MK, Toma NK. Diabetes and depression: The impact of fluoxetine on glycemic control. *Eur Psychiatry*, 2007; 22(1): S106.
13. Ebrahim M, Tamiru D, Hawulte B, Misgana T. Prevalence and associated factors of depression among diabetic outpatients attending diabetic clinic at public hospitals in Eastern Ethiopia: A cross-sectional study. *SAGE Open Med.*, 2021; 9.
14. Al-Smadi AM, Gharaibeh B. Prevalence of Depression and its Associated Factors among Jordanian Diabetic Foot Patients. *Int J Med Res Heal Sci.*, 2019; 8(3): 43-52. WE-Emerging Sources Citation Index (ESCI).
15. Zahraa M. Hussein AL-Khaqani, Thanaa Shams Al-Deen Al-Turaihi. Estimate the Prevalence of Depression in Type 2 Diabetes Patients. *Kufa Med J.*, 2024; 20(1): 158–67.
16. Sweileh WM, Abu-Hadeed HM, Al-Jabi SW, Zyoud SH. Prevalence of depression among people with type 2 diabetes mellitus: A cross sectional study in Palestine. *BMC Public Health*, 2014; 14(1).
17. Ferreira MC, Piaia C, Cadore AC, Antonioli MA, Gamborgi GP, De Oliveira PP. Clinical variables associated with depression in patients with type 2 diabetes. *Rev Assoc Med Bras*, 2015; 61(4): 336–40.
18. Abuhegazy H, Mujairi A, Banah F, Agdi Y, Elkeshishi H, Kamel A, et al. Depression and Associated Risk Factors Among Type 2 Diabetic Patients: A Cross Sectional Study on a Convenience Sample from the Diabetic Center, Khamis Mushait; Saudi Arabia. *Neuropsychiatr Dis Treat*, August 2022; 18: 1975–84.
19. Jeong JH, Um YH, Ko SH, Park JH, Park JY, Han K, et al. Depression and mortality in people with type 2 diabetes mellitus, 2003 to 2013: A nationwide population-based cohort study. *Diabetes Metab J.*, 2017; 41(4): 296–302.
20. Chae WR, Kohring C, Rohde C, Köhler-Forsberg O, Otte C, Holstiege J. Eight-year nationwide study of the bidirectional association between type 2 diabetes and depression in nearly 8 million German outpatients. *BMJ Open Diabetes Res Care.*, 2024; 12(3): e003903.
21. Wu Y, Chen M, Liu T, Zhou J, Wang Y, Yu L, Zhang J, Tian K. Association between depression and risk of type 2 diabetes and its sociodemographic factors modifications: A prospective cohort study in southwest China. *J Diabetes*, 2023; 15(8): 677–87. doi:10.111.
22. Hadi ZM, Hanoon YK. Depression among Patients with Diabetes Mellitus Type 2 Attending the National Diabetes Center in Baghdad, January 2020; 25: 13412051.
23. Sattar S, Ahmed A, Qureshi AW. Gender differences in depression and self-care in patients with type 2 diabetes mellitus. *J Coll Physicians Surg Pak.*, 2019; 29(12): 1150-1154. doi:10.29271/jcsp.2019.12.1150.
24. Sana, M. A., Kashif, N., & Azam, K. Frequency of Depression in Patients of Type 2 Diabetes Mellitus. *Pakistan Armed Forces Medical Journal*, 2022; 72(6): 2094-2097.
25. Imarhiagbe C, Dickson C, Soroye M. Sociodemographic factors associated with depression among persons with type 2 diabetes mellitus in the family medicine clinic of a tertiary hospital in southern Nigeria. *Niger Med J.*, 2023; 64(3): 156–62.
26. Mahan SJ, Mahammad MM. Depression and Associated Factors among Type 2 Diabetics in Karbala City, Iraq: As a Model of Anti-depressant Drugs. *Int J Drug Deliv Technol*, 2023; 13(3): 1125–30.
27. Park SH, Lee YB, Lee K, Kim B, Cho SH, Kwon SY, et al. Risk of depression according to cumulative exposure to a low-household income status in individuals with type 2 diabetes mellitus: a

- nationwide population-based study. *Diabetes Metab J.*, 2024; 48(1): 134.
28. Fatima M, Wang Z, Din ZU, Juan L, Ke C, Xie P. Evidence based prevalence of diabetes related depression in Kohat, Pakistan: a cross-sectional study. *BMC Public Health*, 2025; 25(1).
 29. Šabanović AM, Maksimovic N, Stojanovic-Tasic M, Bakic M, Grgurevic A. Factors associated with depression in the patients with diabetes mellitus type 2. *Vojnosanit Pregl*, 2019; 76(5): 497–503.
 30. Zhang C, Wu Z, Lopez E, Magboo MG, Hou K. Symptoms of depression, perceived social support, and medical coping modes among middle-aged and elderly patients with type 2 diabetes. *Front Mol Biosci*, March 2023; 10: 1–11.
 31. Dukato A, Beyamo A, Habte Hailegebireal A, Teklehaimanot WZ, Ayfokru A, Alemnew M, et al. Depression and associated factors among patients with type 2 diabetic mellitus in Ethiopia: a cross sectional study. *Front Psychiatry*, October 2024; 15: 1–8.
 32. Oseph JJ, Golden SH. Cortisol dysregulation: the bidirectional link between stress, depression, and type 2 diabetes mellitus. *Ann N Y Acad Sci.*, 2017; 1391(1): 20-34. doi:10.1111/nyas.13217.
 33. D'Amato C, Morganti R, Greco C, Di Gennaro F, Cacciotti L, Longo S, et al. Diabetic peripheral neuropathic pain is a stronger predictor of depression than other diabetic complications and comorbidities. *Diabetes Vasc Dis Res.*, 2016; 13(6): 418–28.
 34. Al Maliki A, Lami F, Al Aboudi S. Prevalence and determinants of depression among diabetic patients, Babel Province, Iraq, 2013–2014. *J Fac Med Baghdad*, Jan. 4, 2015; 56(4): 411–6.
 35. Hyassat D, Al-Doseri S, Hashem J, Bani-Mustafa R, El-Khateeb M, Dalila B, Kamel A. Prevalence, Gender Differences and Associated Factors of Depression among Adults with Type 2 Diabetes, Jordan. *J Depress Anxiety*, 2017; S12: 003.
 36. Tran NMH, Nguyen QNL, Vo TH, Anh Le TT, Ngo NH. Depression among patients with type 2 diabetes mellitus: Prevalence and associated factors in Hue City, Vietnam. *Diabetes, Metab Syndr Obes*, 2021; 14: 505–13.
 37. Mahalli E. Prevalence and Predictors of Depression among Type 2 Diabetes Mellitus Outpatients in Eastern Province, Saudi Arabia. *Int J Health Sci (Qassim)*, 2015; 9(2): 120–6.
 38. Zheng C, Yin J, Wu L, Hu Z, Zhang Y, Cao L, et al. Association between depression and diabetes among American adults using NHANES data from 2005 to 2020. *Sci Rep.*, 2024; 14(1): 1–11.