

# Evaluation of the Prevalence of Anxiety and Depression and Its Associated Factors among Type 2 Diabetic Patients in Baghdad, Iraq

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## ABSTRACT

**Aim and objectives:** The link between chronic diseases like diabetes and mental health issues must be investigated to enhance patient care and quality of life. Anxiety and depression disorders were investigated among Iraqi type II diabetics in Baghdad, as well as risk factors.

**Method:** This cross-sectional study included 245 patients from two hospitals in different regions of Baghdad who attended diabetic clinics. The researcher used pre validated Arabic translated questionnaires to obtain field data. It ran from October through December 2021. The percentage represented the individuals' anxiety and depression prevalence. The data were analyzed using IBM-SPSS 25. These variables were investigated using uni-and multivariate linear regression with 95% Confidence Intervals (CI).

**Key findings:** Anxiety symptoms were evident in 72.6% of participants, whereas depression symptoms were present in 64.3%. Marked anxiety (n=89, 36.3%) and depression (n=75, 30.6%) were found in the participants. Moderate anxiety (n=89, 36.3%) and moderate depression (n=59, 24.1%) were seen in the subjects.

**Conclusions:** The current study found a high prevalence of depression and anxiety among Iraqi type II diabetics. High BMI and female gender were predicted to increase anxiety in Iraqi diabetics. The female gender, alcohol, poor glycaemic control, and anxiety were connected to depression among Iraqi diabetics.

**Key words:** Prevalence, Anxiety, Depression, Type 2 diabetes mellitus, Predicted factors

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## INTRODUCTION

Diabetes Mellitus (DM) is a collection of metabolic illnesses that induce hyperglycemia due to issues with insulin synthesis, insulin action, or both. In other words, DM is a long-term condition that causes a lot of damage to the body. It has high blood glucose levels because of problems with insulin production, insulin action, or both [1,2].

## Diabetes mellitus diagnosis

The RBS test with a 200 mg/dL or higher is needed to establish the existence of distinctive signs and symptoms of hyperglycaemia. Further tests should be undertaken to establish the diagnosis in addition to an HbA1c level of 6.5% or above, an FBS level of "(7.0 mmol/L) 126 mg/dL" or a 2 hrs blood glucose level of "two hundred 200 mg/dL" or higher following an OGTT with a 75 g glucose load [2].

## Diabetes mellitus prevalence

According to the International Diabetes Federation (IDF), the prevalence of diabetes among adults worldwide in 2017 is expected to be 8.8% (425 million people). The IDF region with the most significant prevalence of diabetes, at 9.2%, is located in the Middle East. The number of diabetics in the Middle East and North Africa (MENA) is predicted to rise to 110% between 2017 and 2045, reaching 629 million. More than 1.4 million Iraqis have

diabetes. The prevalence of type II diabetes mellitus in Iraq has been estimated to be anywhere from 8.5% to 13.9%. More than 5400 persons in Basrah, southern Iraq, participated in a local survey that found a diabetes incidence of 19.7% among those aged 19 to 94 [3]. Basra, Iraq, researchers found that one in five persons has diabetes; it's more prevalent in women (70.3%) than men (69.1%) [4].

### Anxiety and depression in diabetic patients

Anxieties are a troubling sensation of fear and dread that is a danger to life or is believed to be a threat to life, while depression disrupts emotions, cognition, and behaviour. Diabetes is a chronic ailment, and it, like other chronic medical disorders, causes stress in people, lowering their quality of life [5]. Anxiety may develop in diabetes patients due to poor adaptation to the disease itself, its complication, or its treatment plans, a person might have mild, moderate, or severe anxiety; moderate anxiety is essential in assuring motivation [6]. Diabetic patients who have depression and anxiety have a poorer diabetes prognosis, inadequate patient adherence to therapy, reduced quality of life, and elevated mortality risk, according to findings [7]. Depression in all its types may be "mild, moderate, or severe, with or without psychotic symptoms"; it might be a first episode, a recurrence, or a chronic episode [8]. Diabetes and mood disorders seem to have a bidirectional link, a complicated interaction that shared pathophysiological pathways may mediate. Understanding the components of such systems may lead to improved treatment and outcomes for diabetes and mental disorders [9].

## MATERIALS AND METHODS

**Study design:** Study approval was received from the Iraqi MOH and the two hospitals in Baghdad, Iraq. The consent forms of the participants were obtained before their inclusion in research. Participants were only permitted to participate in the study if they consented to sign the permission form.

This was a cross-sectional study conducted in the city of Baghdad, Iraq, among people who went to diabetic clinics at two hospitals in different zones of the city. Prevalidated Arabic translated questionnaires were used to gather study data, which was done face to face by the researcher in the field. The participants in the study was 245 patients, 122 patient from Al-Kindy endocrine and diabetes centre and 123 patient from Al-Khadimiya teaching hospital. Participants were recruited from October to December 2021. The study's participants were continuously recruited until the target number was reached. The percentage was used to calculate the prevalence of anxiety and depression among the study's participants.

**Sampling procedure:** Systematic sampling was applied to select the participants at the diabetic clinic in each of the two hospitals named Al-Kindy endocrine and diabetes center 122 Al-Khadimiya teaching hospital 123. For each clinic, the sampling interval was based on the monthly

average outpatient attendance at the clinic. The sampling interval was found by dividing the average monthly outpatient clinic attendance (N) by the required sample size (n). The study participants were identified based on the order of the patients who refer to the clinic. A simple random selection of the first patient was made from the first interval, and then subsequent patients were selected using the systematic interval until the desired sample size was reached.

**Inclusion criteria:** Individuals included in the study were Type II diabetics for a minimum of one year with ages 18 to 70.

**Exclusion criteria:** A family member who lost and/or their job in the month before enrolment in the research, type II diabetes patients with ages less than 18 years and more than 70 years old, patients with drug and alcohol dependence, patients with severe comorbid conditions, patients with a previous diagnosis of depression/anxiety or any other major psychiatric illness, Patients with severe cognitive impairment, patient already on any psychotropic drugs known to affect blood cortisol levels, such as corticosteroids and patients who refused to participate were excluded from the study.

### Privacy and confidentiality

Personal data was stored in a password protected database. Subject datasheets used numbers rather than patient IDs. All data was entered into a password protected PC. Post research, the data on the computer was copied to CDs and the machine was erased. Finished data will be kept on CDs and in a locked office for three years. After that time, CD and data storage will be discontinued. Participants' data will be kept in an inaccessible database. Subjects may seek access to study results by writing to researchers.

### Statistical analysis

The data were evaluated using SPSS version 25. Results are expressed as percentages to get the prevalence of depression and anxiety among participant patients. "Linear regression (univariate and multivariate) analyses" were performed to evaluate the relationships between anxiety, depression, and associated factors at 95% Confidence Intervals (CI).

## RESULTS

### Prevalence of anxiety and depression among the participant patients

Table 1 illustrates the prevalence according to the severity of symptoms of anxiety and depression among the total participant patients. Symptoms of anxiety were present in (n=178, 72.6%) of participant patients, while (n=134, 64.3%) of participant patients had symptoms of depression. The prevalence of Marked anxiety was (n=89, 36.3%), while Marked depression prevalence was present in (n=75, 30.6%) of the participants. Moderate anxiety was present in (n=89, 36.3%) of the participants,

and Moderate depression was present in (n=59, 24.1%) of the participants.

**Table1: Prevalence of anxiety and depression among the participant patients.**

HAD score	Anxiety (n=245), (%) Overall	Depression (n=245), (%) Overall
Normal (0-7)	67 (27.3%)	111 (45.3%)
Moderate (8-10)	89 (36.3%)	59 (24.1%)
Marked (11-21)	89 (36.3%)	75 (30.6%)

### Regression analysis

**Univariate regression analysis:** Univariate linear regression analysis showed that the significant predictors of anxiety are: female gender  $P \leq 0.001$ , a high value of fasting blood sugar  $P \leq 0.001$ , primary school level,  $P=0.001$ , secondary schooling level,  $P=0.048$ , patient's unemployment,  $P=0.001$ , low income of the patient,  $P=0.001$ , patient's high BMI,  $P \leq 0.01$ , a high value of

calculated (HbA1c),  $P \leq 0.001$ , and depression with a high rating,  $P \leq 0.01$ . The coefficient beta indicates that the unemployment of the patient at 2.713 and the female gender at 2.391 have the greatest effect on anxiety score; refer to Table 2 for more clarifications.

**Table 2: Factors affecting anxiety score among participant patients shown by univariate regression analysis.**

"Model"		"Unstandardize d coefficients"	"Standardized coefficients"	"Beta"	"t"	"Sig."	"95.0% Confidence Interval for B"	
							"B"	"Std. Error"
Gender	Male (reference)	1						
	Female	2.391	0.508	0.289	4.708	<0.001	1.39	3.391
Residence Zone	Urban (reference)	1						
	Rural	-1.41	0.857	-0.105	-1.644	0.101	-3.099	0.279
Hospital	Al-Kindy (reference)	1						
	Al-Khadimiya	-0.103	0.513	-0.013	-0.2	0.842	-1.112	0.907
Smoking	Yes (reference)	1						
	No	0.706	0.591	0.076	1.195	0.233	-0.458	1.87
Alcohol consumption	Yes (reference)	1						
	No	-1.498	1.292	-0.074	-1.16	0.247	-4.042	1.046
Marital status	Married (reference)	1						
	Single	-0.324	1.442	-0.014	-0.225	0.822	-3.164	2.516
	Divorced	2.487	1.806	0.088	1.378	0.17	-1.069	6.044
	Widowed	-0.908	2.33	-0.025	-0.39	0.697	-5.496	3.681
Education	Postgraduate (reference)	1						
	Primary	1.813	0.514	0.221	3.528	0.001	0.801	2.826
	Secondary	1.238	0.622	0.127	1.991	0.048	0.013	2.463
	Undergraduate	-1.262	0.682	-0.118	-1.852	0.065	-2.605	0.081
Occupation	Government sector (reference)	1						
	Private sector	-1.267	0.979	-0.083	-1.295	0.197	-3.196	0.661
	Self-employment	-1.224	0.646	-0.121	-1.894	0.059	-2.496	0.049
	Retired	-0.163	0.862	-0.012	-0.189	0.851	-1.861	1.536
	Unemployment	2.713	0.49	0.335	5.539	<0.001	1.749	3.678
Age original value	0.045	0.026	0.111	1.744	0.083	-0.006	0.096	
Income original value	-0.002	0	-0.301	-4.912	<0.001	-0.003	-0.001	
BMI original value	0.82	0.045	0.757	18.079	<0.001	0.73	0.909	
FBS original value	0.07	0.003	0.843	24.43	<0.001	0.064	0.075	
HbA1c original value	2.053	0.07	0.884	29.502	<0.001	1.916	2.19	
Depression original score	0.833	0.032	0.856	25.827	<0.001	0.769	0.896	

In addition to that, “univariate linear regression” showed significant predictors of depression are female gender,  $P \leq 0.001$ , alcohol intake status,  $P=0.013$ , FBS,  $P \leq 0.001$ , the calculated (HbA1c),  $P \leq 0.001$ , primary education level,  $P \leq 0.001$ , patients who work in the private sector,  $P=0.042$ , unemployment of the patient,  $P \leq 0.001$ , age of the patient, low income of the patient,  $P \leq 0.001$ , BMI,  $P \leq 0.001$ , and anxiety with a high rating,  $P \leq 0.001$ . Again the

coefficient beta value indicates that the unemployment of the patient at 2.923 and the female gender at 2.357 have the greatest effect on depression; refer to Table 3 for more clarifications.

**Table 3: Factors affecting depression score among participant patients shown by univariate regression analysis.**

"Model"		"Unstandardize d coefficients"	"Standardized coefficients"	"Beta"	"t"	"Sig."	"95.0% Confidence Interval for B"	
		"B"	"Std. Error"				"Lower Bound"	"Upper Bound"
Gender	Male (reference)	1						
	Female	2.357	0.524	0.277	4.497	<0.001	1.324	3.389
Residence Zone	Urban (reference)	1						
	Rural	-1.396	0.882	-0.101	-1.583	0.115	-3.134	0.341
	Al-Kindy (reference)	1						
Hospital	Al-Khadimiya	0.242	0.527	0.029	0.46	0.646	-0.796	1.28
Smoking	Yes (reference)	1						
	No	0.762	0.608	0.08	1.254	0.211	-0.435	1.959
Marital status	Married (reference)	1						
	Single	-0.613	1.482	-0.027	-0.413	0.68	-3.533	2.307
	Divorced	2.917	1.855	0.1	1.573	0.117	-0.736	6.57
	Widowed	-0.01	2.396	0	-0.004	0.997	-4.73	4.711
Education	Postgraduate (reference)	1						
	Primary	1.981	0.527	0.234	3.76	<0.001	0.943	3.019
	Secondary	0.883	0.642	0.088	1.375	0.17	-0.382	2.148
	Undergraduate	-0.851	0.704	-0.077	-1.209	0.228	-2.238	0.535
Occupation	Government sector (reference)	1						
	Private sector	-2.049	1.002	-0.13	-2.046	0.042	-4.022	-0.076
	Self-employment	-1.135	0.665	-0.109	-1.706	0.089	-2.446	0.176
	Retired	-0.426	0.886	0.886	-0.481	0.631	-2.172	1.319
	Unemployment	2.923	0.501	0.351	5.838	<0.001	1.937	3.909
	Age original value	0.054	0.027	0.128	2.018	0.045	0.001	0.106
Income original value	-0.002	0	-0.314	-5.149	<0.001	-0.003	-0.001	
BMI original value	0.724	0.054	0.651	13.352	<0.001	0.617	0.831	
Alcohol consumption	-3.291	1.315	-0.159	-2.503	0.013	-5.882	-0.701	
FBS original value	0.066	0.003	0.773	18.967	<0.001	0.059	0.072	
HbA1c original value	1.918	0.091	0.803	21.033	<0.001	1.739	2.098	
Anxiety original score	0.88	0.034	0.856	25.827	<0.001	0.813	0.948	

**Multivariate regression analysis:** Multivariate linear regression showed significant predictors of anxiety are female gender,  $P=0.006$ , zone of residence,  $P=0.039$ , alcohol consumption,  $P=0.038$ , high HbA1c value of the patient,  $P$ -value  $<0.01$ , high BMI value of the patient,  $P \leq 0.01$ , and depression with a high rating,  $P \leq 0.01$ . The unstandardized coefficient beta indicates that the alcohol consumption status of 1.087 and high HbA1c value of 1.003 have the greatest effect on anxiety. The value of

“square R”, in this case, is 0.871; that is to say, the independent variables, when taken as a group, account for 87.1% of the variance of the total anxiety score; refer to Table 4 for more clarifications.

**Table 4: Factors affecting anxiety score among participant patients shown by multivariate regression analysis.**

"Model"		"Unstandardize d coefficients"	"Standardized coefficients"	"Beta"	"t"	"Sig."	"95.0% Confidence Interval for B"	
							"B"	"Std. Error"
Gender	Male (reference)	1						
	Female	0.741	0.269	0.09	2.758	0.006	-1.3292	-7.163
Residence Zone	Urban (reference)	1						
	Rural	-0.7	0.336	-0.052	-2.081	0.039	-1.362	-0.037
Smoking	Yes (reference)	1						
	No	-0.015	0.245	-0.002	-0.063	0.95	-0.498	0.467
Alcohol consumption	Yes (reference)	1						
	No	1.087	0.521	0.054	2.086	0.038	0.06	2.114
Marital status	Married (reference)	1						
	Divorced	0.085	0.712	0.003	0.119	0.905	-1.318	1.488
Education	Postgraduate (reference)	1						
	Primary	0.044	0.416	0.005	0.106	0.915	-0.776	0.865
	Secondary	0.461	0.421	0.047	1.095	0.275	-0.369	1.291
	Undergraduate	-0.329	0.375	-0.031	-0.877	0.382	-1.069	0.41
Occupation	Government sector (reference)	1						
	Private sector	-0.062	0.409	-0.004	-0.151	0.88	-0.867	0.744
	Self-employment	0.3	0.306	0.03	0.979	0.329	-0.303	0.903
	Unemployment	0.182	0.359	0.022	0.507	0.612	-0.526	0.891
Age original value		0.011	0.011	0.028	1.047	0.296	-0.01	0.033
Income original value		5.769	0	0.009	0.16	0.873	-0.001	0.001
BMI original value		0.148	0.044	0.136	3.379	0.001	0.062	0.234
FBS original value		0.006	0.005	0.075	1.243	0.215	-0.004	0.016
HbA1c original value		1.003	0.156	0.432	6.429	<0.001	0.696	1.311
Depression original score		0.318	0.044	0.327	7.262	<0.001	0.231	0.404

The "Multivariate linear regression" also displayed significant predictors of depression are alcohol consumption  $P=0.006$ , age of the patient  $P=0.029$ , and high anxiety score of the patient  $P \leq 0.001$ . At the same time, the coefficient beta indicates that the alcohol consumption status of -1.963 and the high anxiety score of the patient at 0.594 have the greatest effect on depression. The value of "square R", in this case, is 0.773;

that is to say, the independent variables, when taken as a group, account for 77.3% of the variance of the total depression score; refer to Table 5 for more clarifications.

**Table 5: Factors affecting depression score among participant patients shown by multivariate regression analysis.**

"Model"		"Unstandardize d coefficients"	"Standardized coefficients"	"Beta"	"t"	"Sig."	"95.0% Confidence Interval for B"	
							"B"	"Std. Error"
Gender	Male (reference)	1						
	Female	0.075	0.373	0.009	0.202	0.84	-0.66	0.811
Residence Zone	Urban (reference)	1						
	Rural	-0.409	0.463	-0.03	-0.883	0.378	-1.322	0.504
Smoking	Yes (reference)	1						
	No	0.368	0.334	0.039	1.103	0.271	-0.289	1.026
Alcohol consumption	Yes (reference)	1						
	No	-1.963	0.708	-0.095	-2.774	0.006	-3.357	-0.569
Marital status	Married (reference)	1						
	Divorced	-0.008	0.973	0	-0.009	0.993	-1.926	1.91

Education	Postgraduate (reference)	1						
	Primary	-0.043	0.569	-0.005	-0.075	0.94	-1.165	1.08
	Secondary	-0.307	0.577	-0.031	-0.533	0.595	-1.444	0.829
	Undergraduate	0.234	0.514	0.021	0.456	0.649	-0.778	1.247
Occupation	Government sector (reference)	1						
	Private sector	-0.721	0.557	-0.046	-1.296	0.196	-1.818	0.375
	Self-employment	0.388	0.419	0.037	0.927	0.355	-0.437	1.213
	Unemployment	0.535	0.49	0.064	1.091	0.276	-0.431	1.502
	Age original value	0.032	0.015	0.077	2.201	0.029	0.003	0.061
	Income original value	0	0	-0.07	-0.991	0.323	-0.001	0
	BMI original value	-0.09	0.061	-0.081	-1.483	0.139	-0.211	0.03
	FBS original value	0.012	0.007	0.141	1.764	0.079	-0.001	0.025
	HbA1c original value	0.439	0.23	0.184	1.909	0.058	-0.014	0.893
	Anxiety original score	0.594	0.082	0.577	7.262	<0.001	0.433	0.755

## DISCUSSION

The present research evaluated depression and anxiety disorders prevalence in Iraqi type II diabetic patients in Baghdad; in addition, the assessment of possible associated factors of these disorders among Iraqi diabetic patients in Baghdad has been reported.

### The prevalence of depression and anxiety disorders

The present study showed that anxiety and depression are common disorders in Baghdad among type II diabetic Iraqi patients. Where 36.3% reported moderate anxiety and 36.3% had been exhibited a marked anxiety disorder. Whereas 24.1% of the study participants showed moderate depression and 30.6% was a revealed marked depression disorder. The overall prevalence, of anxiety and depression, in the current study diabetic population was 72.6% and 54.7%, respectively. The prevalence rates observed in the current research sample were more than previously observed studies [10,11]. The survey conducted by Grigsby et al reported that nearly 40% of diabetic patients had shown anxiety symptoms, and 14% confirmed the anxiety disorders in his study population [12].

### Factors associated with depression and anxiety disorders

Females experienced more anxiety problems than men, the study revealed, and similar findings for a depressed condition. We found agreement with Naicker K, et al. and Sun N, et al. [13,14]. Another review study carried out by Roupa, et al. [15] was found that the depression level of females was almost two times higher than men. Multiple regression analysis also showed that those residing in urban areas had high anxiety prevalence. The association between residencies in urban zones with an elevated anxiety disorder has also been reported in several other studies done by Anjum A, et al. and VS P, et al. [16,17].

The univariate regression analysis displayed a positive association between high BMI with anxiety and depressive disorders. This is consistent with the study

conducted by Roupa, et al. [15] and the study carried out by Habtewold TD, et al. [18]. BMI and anxiety were shown strongly correlate in the multiple regression analysis. In contrast, it doesn't show that with depression which may be attributed to the effect of other variables included in the analysis. The present research found that poor glycemic management was positively linked to anxiety and depression. Previous clinical researches have also indicated the same association between inadequate glycemic control and anxiety and depression [19,20].

Previous studies displayed a positive association between anxiety and depression disorder. Existing research found a strong link between anxiety and a high depression score >10. The current study also agreed that depression significantly correlates with high anxiety scores >10. This is because having anxiety symptoms is associated with a poorer prognosis, and this has been observed in the study of depression as well [21].

The present study showed that alcoholic participants were more prone to high depression disorder scores than non-alcoholic participants. These findings are consistent with many clinical other studies [22,23]. The study done by Li J, et al. found that depressive symptoms were more common in those who drank alcohol and drank alcohol heavily than in those who didn't or were low drinkers. However, the association was only significant when controls were limited to non-heavy drinkers [24]. The research study conducted by Costa CE, et al. reported direct clinical significance between alcohol consumption and depression disorder [25].

According to this research, a higher educational level was shown to be connected with reduced anxiety and depression levels in diabetes patients. According to certain studies, having a higher education level is a preventive factor against anxiety and depression in patients with type II diabetes [26,27]. Another survey by Hong JS, et al. reported a greater incidence of depression in patients with poor educational attainment than in patients who have completed more than six years of formal education [28]. The findings of research done by Melkevik O, et al. are; agree with those of the present

study, which found that lower educational attainment was connected with greater levels of anxiety and depressive symptoms [29].

The current study reported anxiety and depression disorders in unemployed patients. Previous studies showed that unemployment had significantly worse perceived mental health scores [30-32]. The present study revealed a positive association between low monthly income and anxiety and depression, the study done by Thomas J, et al. reported that low monthly income shows a positive relationship with anxiety and depression disorders [33]. Furthermore, Sareen J, et al. performed research revealing that patients with poor income are more likely to suffer from mental illnesses and attempt suicide and a decrease in income is related to an increased chance of developing mental diseases [34].

The current study revealed that older diabetic patients were more prone to depression than younger patients. This is consistent with the other relevant study conducted by Ribeiro O, et al. [35]. According to the findings of research done by Mirowsky J, et al. depression is at its lowest point in middle-aged people (age 45) and its greatest point in older adults (age 80 or more).

#### Study strength and limitations

**Strength of the study:** The questions included in the questionnaire were answered directly by the patients by face to face supervision of the researcher; in addition to the lab tests included in the study were performed in the same labs to decrease the variations that may be seen between patients in investigations.

**Study limitations:** The study was conducted in Baghdad city; therefore, a generalization of the findings of this research is not possible for the other cities in Iraq.

#### CONCLUSION

As per the results of the current study, we found that there was a high prevalence of depression and anxiety among type II diabetic Iraqi patients. Female gender, low educational level, unemployment, poor glycemic control, low monthly income, high BMI, and higher depression scores were all predicted to be related to high anxiety ratings in Iraqi diabetic patients. Female gender, alcohol consumption status, poor glycemic control, low educational level, unemployment, low monthly income, high BMI value, and high anxiety score were all indicated to be risk factors for depression in Iraqi diabetics.

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