Original Article :

Prevalence and Factors Related To Anxiety and Depression Among Type 2 Diabetic Patients In Riyadh

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Abstract

Background and Aims:

Type 2 diabetes mellitus (T2DM) is highly prevalent in Saudi Arabia and is a primary reason for mortality and morbidity. Patients with chronic medical diseases, such as diabetes, have psychological challenges while attempting to control their medical issues. This investigation aimed to evaluate the prevalence of anxiety and depression among T2DM patients in Riyadh, Saudi Arabia.

Methods:

From February 2021 to August 2021, this descriptive, questionnaire-based cross-sectional study was carried out at three endocrinology facilities in Riyadh. Data were gathered from T2DM patients who visited endocrinology facilities for follow-up care. The Hospital Anxiety and Depression (HAD) Scale was used to evaluate anxiety and depression. Utilizing R v. 3.6.3, statistical analysis was carried out.

Results:

Data of 385 T2DM patients showed a Mean anxiety score of 6.3 ± 4.8 and a mean depression score of 5.9 ± 4.1. More than 20% and 15 % were in an abnormal category of anxiety and depression. The prevalence of anxiety and depression was reported to be significantly higher in females 56 (28.4%, $P < 0.001$). Anxiety and depression were the least prevalent in patients with a bachelor's degree [26 (14.7%) and 15 (8.47%), respectively]. Income and marital status did not significantly correlate with anxiety ($P > 0.05$). Diabetic nephropathy was associated with a higher prevalence of anxiety.

Conclusions:

In T2DM patients, anxiety and depression are linked to sociodemographic and medical health variables. Monitoring for co-morbid depression and associated risk factors is suggested due to the high prevalence of anxiety and depressive disorders in diabetic patients.

Keywords:

Anxiety, Depression, Diabetes type2, Riyadh, Saudi Arabia.

Introduction

Diabetes Mellitus (DM) is a chronic metabolic pathology characterized by a malfunction or deficiency of insulin synthesis in the pancreas [1]. The International Diabetes Federation reported that 425 million people globally had Type 2 Diabetes Mellitus (T2DM) in 2021, projected to climb to 783 million in 2045 [2]. Saudi Arabia ranks second in the Middle East and seventh worldwide in terms of disease prevalence [3] .According to a recent study, the prevalence of T2DM in Saudi Arabia, particularly in Riyadh, was 23.4% [4].

Insulin resistance and a relative insulin secretory deficiency are the major pathophysiological flaws causing type 2 diabetes. Age, obesity, genetic predisposition, ethnicity, insufficient physical activities, and food are the key etiological risk factors [5] . Studies have reported that chronic diseases are associated with depression, stress, anxiety, and other psychological symptoms [6]. Similarly, diabetes is linked to several consequences, including mental health issues, notably depressive disorders [7], and significantly impact the patients quality of life [8]. Patients with diabetes have a higher prevalence of depressive disorders, ranging from 10% to 15%, roughly twice as high as non-diabetics [9, 10]. Depression was prevalent among 43.6% and 34.8% of diabetic patients [11] In Saudi Arabia

According to evidence, anxiety and depression and their association with DM appear to have a bidirectional link. Patients with anxiety symptoms are more likely to acquire type 2 diabetes and vice versa [12]. Our study aims to assess the prevalence and factors associated with anxiety and depression among T2DM patients in Riyadh city.

Methodology

This descriptive cross-sectional study was conducted on individuals with a history of T2DM, from February 2021 to August 2021. T2DM Patients, residents of Riyadh city between 18 to 90 years, were selected, opting simple random sampling method from the endocrinology clinics of Imam Medical Center, Al-Ghadeer Primary Health Care Center, and King Fahad Medical City. Patients with psychological problems who used antidepressants, anti-anxiety medications, antipsychotics, mood stabilizers and were admitted to the Intensive Care Unit were excluded.

In the current study, questionnaires were used in English as well as in Arabic languages with three main components (socio-demographic, clinical health information, and anxiety and depression measurement) using the previously validated Hospital Anxiety and Depression

(HAD) Scale. A study conducted in Saudi Arabia found that 95% of the individuals found the HAD scale acceptable. The study also used Cronbach's alpha coefficient to assess the instrument's reliability. It was α=0.73 for anxiety and α=0.77 for depression subscales of the HADS. (13) The HADS is a self-assessment tool used in a hospital outpatient clinic setting to detect anxiety and depression. The depression and anxiety subscales each have seven items. Each item ranges from 0 to 3, with higher scores indicating higher degrees of anxiety or depression. The following cut-off points were used for anxiety and depression: 0–7 = normal, 8–10 = borderline abnormal, and 11–21 = abnormal.

Considering the population of over 100,000 with a confidence level of 95%, a marginal error of 5%, and a probability of 50%. A sample size of 385 was considered significant. Patients were randomly selected, and informed consent was taken before the commencement of the research. Interviews were taken face to face. All the data were encrypted and stored in password-protected files to ensure confidentiality.

The statistical analysis was conducted using R version 3.6.3. We used frequency and percentages to depict categorical data. Continuous normal and non-normal/ordinal variables were summarized using the mean, standard deviation (SD), or median/interquartile range (IQR). The Chi-square test analyzed the relationship between categorical variables. Spearman's correlation was used to determine the relationship between income, age, education, anxiety, and depression scores. Using stepwise ordinal logistic regression, independent predictors of anxiety and depression were evaluated. The status of the three levels of anxiety and depression scores were ordinal-dependent variables in both models. Using the Akaike information criterion (AIC), model variables were eliminated. At a significance level of < 0.05, hypotheses were tested.

The current study received ethical approval from the Institutional Review Boards of Al-Imam Muhammad Ibn Saud Islamic University and King Fahad Medical City (IRB Log Number: 21-325E). The research was carried out in line with the Helsinki Declaration of 1975, as updated in 2000. Informed consent was taken from all the research participants.

Results

Data from 385 patients revealed a higher proportion of females (n = 197, 51.2 %). Males were 188 (48.8%); patients aged 40-59 years made up half of the study sample (n = 208, 54.1%), 177 (46.0%) patients completed university education, and 83 (21.6%) completed high school only. One-third of the patients reported an average

monthly income of < 5000 SAR. Regarding diabetic vascular complications, 31 (8.05%) and 68 (17.7%) reported a previous cerebrovascular accident and ischemic heart disease, respectively, and 60 (15.6%) had diabetic nephropathy. Only 69 (17.9%) of the patients had diabetes without hypertension or dyslipidemia, 107 (27.8%) had one of the two risk factors, and 209 (54.3%) had both (Table 1).

Table 1. Descriptive statistics for the study sample

Demographic Characteristic		n (%)
Gender	Female	197 (51.2)
	Male	188 (48.8)
Age Group	18–29	07 (1.82)
	30–39	36 (9.35)
	40–49	80 (20.8)
	50–59	128 (33.2)
	60–69	107 (27.8)
	70–79	23 (5.97)
	80 or more	04 (1.04)
Education	Illiterate	47 (12.2)
	Primary	40 (10.4)
	Secondary	38 (9.87)
	High school	83 (21.6)
	University	177 (46.0)
Monthly household income (MHI) in Saudi Riyal:	< 5000 SAR	135 (35.1)
	5000 – 10000 SAR	108 (28.1)
	11000 – 20000 SAR	117 (30.4)
	21000 – 30000 SAR	20 (5.19)
	31000–40000 SAR	01 (0.26)
	40000 SAR or more	04 (1.04)
Marital status	Married	310 (80.5)
	Single	12 (3.12)
	Widowed/Divorced	63 (16.4)
Employment	Employee	120 (31.2)
	Retired	115 (29.9)
	Self-employed	27 (7.01)
	Student	08 (2.08)
	Unemployed	115 (29.9)
Diabetes vascular complications	Cerebrovascular accident	31 (8.05)
	Ischemic heart disease	68 (17.7)
	Diabetic nephropathy	60 (15.6)
Comorbidities	No risk factors	69 (17.9)
	HTN or dyslipidemia	107 (27.8)
	HTN and dyslipidemia	209 (54.3)

The average HADS scores for anxiety and depression were 6.31 ± 4.81 and 5.91 ± 4.11, respectively. Two-thirds of the patients did not have anxiety or depression (score < 8). Anxiety was present in 20.5% (n=79), and depression was observed in 15.1% (n=58) of the included patients (Table 2).

Table 2. Prevalence of anxiety in the study sample (HADS questionnaire)

	N=385
HAD Scores	
(Anxiety (Mean ± SD	(4.8) 6.31
(Depression (Mean ± SD	(4.1) 5.91
(%/Anxiety category (n	
Normal	(65.5) 252
Borderline	(14.0) 54
Abnormal	(20.5) 79
(%/Depression category (n	
Normal	(66.0) 254
Borderline	(19.0) 73
Abnormal	(15.0) 58

A statistically significant negative correlation was observed between age and anxiety (r = -0.113, P < 0.05) but not between age and depression score. Education was negatively associated with anxiety (r = -0.115, P < 0.05) and depression (r = -0.266, P < 0.001). Higher monthly income was negatively associated with the total depression score (r = -0.112, P < 0.05). Depression and anxiety were positively correlated (r = 0.688, P < 0.001). (Table 3) Statistical analysis showed that age distribution was not associated with the prevalence of anxiety or depression disorders (P > 0.05). The prevalence of anxiety was higher in females than in males (28.4% vs. 12.2%, P < 0.001). The responses also indicated a lower prevalence of depression in males than females (P < 0.001), with 75.5% of the males scoring < 8 on the HADS depression scale compared to 56.9% of the females. Education showed a statistically significant association with the prevalence of anxiety and depression (P = 0.018 and 0.001, respectively). Anxiety and depression were least prevalent in patients with a bachelor's degree (14.7% and 8.5%, respectively) and were most prevalent in respondents with a high school education or less. Approximately three-quarters of the patients with university education had normal scores on the HADS depression and anxiety scales compared to approximately

Table 3. Correlation between age, education, income, and raw HADS score

	Age	Education	Monthly income	Anxiety	Depression
Age		-0.299***	-0.087	-0.113*	0.000
Education	-0.299***		0.602***	-0.115*	-0.266***
Income	-0.087	0.602***		-0.077	-0.112*
Anxiety	-0.113*	-0.115*	-0.077		0.688***
Depression	0.000	-0.266***	-0.112*	0.688***	

Computed correlation used spearman-method with listwise deletion.

* P < 0.05, ** P < 0.01, *** P < 0.001

half of the patients with high school education or less. Income did not show a statistically significant association with anxiety (P = 0.63) or depression (P = 0.14).

Marital status also was not significantly associated with anxiety or depression (P = 0.615 and 0.067, respectively). Employment status showed a statistically significant association with depression but not anxiety (P < 0.001), with a higher prevalence of abnormal cases of depression (> 10 points) in self-employed patients. The highest prevalence of normal cases was in retired patients and students (80% and 87.5%, respectively). The prevalence of a borderline HADS score was higher in patients who suffered from a CVA than in those who did not (35.5% vs. 17.5%, P < 0.05). Diabetic nephropathy was associated with a higher prevalence of anxiety, with 67.7% of patients without diabetic nephropathy reporting a normal score on the HADS scale compared to only 53.5% of patients without diabetic nephropathy (P < 0.05). Diabetes and associated risk factors (dyslipidemia and hypertension) did not show a statistically significant association with anxiety (P = 0.274) or depression (P = 0.135) (Table 4).

Table 4. Association between sociodemographic, clinical characteristics, and HADS classification

Demographic Feature	Anxiety				Depression			
	Normal	Borderline	Abnormal	P-Value	Normal	Borderline	Abnormal	P-Value
	N=252	N=54	N=79		N=254	N=73	N=58	
Age Group (In Years)								
30–39	23 (53.5%)	8 (18.6%)	12 (27.9%)	0.66	24 (55.8%)	7 (16.3%)	12 (27.9%)	0.304
40–49	55 (68.8%)	8 (10.0%)	17 (21.2%)		53 (66.2%)	14 (17.5%)	13 (16.2%)	
50–59	85 (66.4%)	18 (14.1%)	25 (19.5%)		84 (65.6%)	28 (21.9%)	16 (12.5%)	
60–69	69 (64.5%)	18 (16.8%)	20 (18.7%)		75 (70.1%)	17 (15.9%)	15 (14.0%)	
70+	20 (74.1%)	2 (7.41%)	5 (18.5%)		18 (66.7%)	7 (25.9%)	2 (7.41%)	
Gender								
Female	110 (55.8%)	31 (15.7%)	56 (28.4%)	<0.001	112 (56.9%)	52 (26.4%)	33 (16.8%)	<0.001
Male	142 (75.5%)	23 (12.2%)	23 (12.2%)		142 (75.5%)	21 (11.2%)	25 (13.3%)	
Education								
Illiterate	29 (61.7%)	6 (12.8%)	12 (25.5%)	0.018	25 (53.2%)	12 (25.5%)	10 (21.3%)	0.001
Primary	17 (42.5%)	11 (27.5%)	12 (30.0%)		19 (47.5%)	11 (27.5%)	10 (25.0%)	
Secondary	21 (55.3%)	6 (15.8%)	11 (28.9%)		23 (60.5%)	5 (13.2%)	10 (26.3%)	

Demographic Feature	Anxiety				Depression			
	Normal	Borderline	Abnormal	P-Value	Normal	Borderline	Abnormal	P-Value
	N=252	N=54	N=79		N=254	N=73	N=58	
Education								
High school	55 (66.3%)	10 (12.0%)	18 (21.7%)	0.018	49 (59.0%)	21 (25.3%)	13 (15.7%)	0.001
University	130 (73.4%)	21 (11.9%)	26 (14.7%)		138 (78.0%)	24 (13.6%)	15 (8.47%)	
Income (SAR)								
< 5000	85 (63.0%)	16 (11.9%)	34 (25.2%)	0.63	84 (62.2%)	32 (23.7%)	19 (14.1%)	0.14
5000-10000	72 (66.7%)	18 (16.7%)	18 (16.7%)		69 (63.9%)	18 (16.7%)	21 (19.4%)	
11000-20000	77 (65.8%)	18 (15.4%)	22 (18.8%)		84 (71.8%)	17 (14.5%)	16 (13.7%)	
21000 -30000	15 (75.0%)	2 (10.0%)	3 (15.0%)		15 (75.0%)	3 (15.0%)	2 (10.0%)	
31000 +	3 (60.0%)	0 (0.00%)	2 (40.0%)		2 (40.0%)	3 (60.0%)	0 (0.00%)	
Marital status								
Married	207 (66.8%)	42 (13.5%)	61 (19.7%)	0.615	211 (68.1%)	58 (18.7%)	41 (13.2%)	0.067
Single	9 (75.0%)	1 (8.33%)	2 (16.7%)		10 (83.3%)	1 (8.33%)	1 (8.33%)	
Widowed / Divorced	36 (57.1%)	11 (17.5%)	16 (25.4%)		33 (52.4%)	14 (22.2%)	16 (25.4%)	
Employment:								
Employee	83 (69.2%)	18 (15.0%)	19 (15.8%)	0.06	78 (65.0%)	27 (22.5%)	15 (12.5%)	< 0.001
Retired	86 (74.8%)	11 (9.57%)	18 (15.7%)		92 (80.0%)	13 (11.3%)	10 (8.70%)	
Self-employed	14 (51.9%)	5 (18.5%)	8 (29.6%)		16 (59.3%)	1 (3.70%)	10 (37.0%)	
Student	6 (75.0%)	1 (12.5%)	1 (12.5%)		7 (87.5%)	0 (0.00%)	1 (12.5%)	
Unemployed	63 (54.8%)	19 (16.5%)	33 (28.7%)		61 (53.0%)	32 (27.8%)	22 (19.1%)	
Cerebrovascular accident								
No	237 (66.9%)	46 (13.0%)	71 (20.1%)	0.063	240 (67.8%)	62 (17.5%)	52 (14.7%)	0.026
Yes	15 (48.4%)	8 (25.8%)	8 (25.8%)		14 (45.2%)	11 (35.5%)	6 (19.4%)	
IHD:								
No	214 (67.5%)	42 (13.2%)	61 (19.2%)	0.187	212 (66.9%)	56 (17.7%)	49 (15.5%)	0.369
Yes	38 (55.9%)	12 (17.6%)	18 (26.5%)		42 (61.8%)	17 (25.0%)	9 (13.2%)	
Diabetic nephropathy								
No	220 (67.7%)	39 (12.0%)	66 (20.3%)	0.021	216 (66.5%)	59 (18.2%)	50 (15.4%)	0.627

Demographic Feature	Anxiety				Depression			
	Normal	Borderline	Abnormal	P-Value	Normal	Borderline	Abnormal	P-Value
	N=252	N=54	N=79		N=254	N=73	N=58	
Diabetic nephropathy								
Yes	32 (53.3%)	15 (25.0%)	13 (21.7%)	0.021	38 (63.3%)	14 (23.3%)	8 (13.3%)	0.627
Diabetes								
Alone	41 (59.4%)	12 (17.4%)	16 (23.2%)	0.274	42 (60.9%)	10 (14.5%)	17 (24.6%)	0.135
Plus HTN / dyslipidemia	78 (72.9%)	14 (13.1%)	15 (14.0%)		75 (70.1%)	20 (18.7%)	12 (11.2%)	
Plus HTN and dyslipidemia	133(63.6%)	28 (13.4%)	48 (23.0%)		137 (65.6%)	43 (20.6%)	29 (13.9%)	

Discussion

The prevalence of anxiety and depression among individuals with T2DM residing in Riyadh City was evaluated using the HAD scale. According to the findings, two out of every ten people with T2DM had HAD scores higher than eleven for anxiety, and fifteen percent had HAD scores higher than eleven for depression. Two-thirds of the T2DM patients reported scores below three and were considered normal. Anxiety and depression were more prevalent in females, patients between 30 to 39 years, widowed or divorced, and those who had experienced a cerebral hemorrhage.

Similar to the results of our study, a Saudi study, found that 73.4 % of the participants were normal, 17.7% were borderline abnormal, and 8.9% were classified in the abnormal category of depression [14]. Furthermore, for anxiety scores, the study found that 80.8% were normal, 10.3% were borderline abnormal, and 8.9 % were abnormal. Moreover, it was also reported that diabetic individuals are three times more prone than non-diabetic patients to developing depression and anxiety [14].

According to published reports, DM and major depressive disorder are both crippling illnesses, the relationship between these two disorders lead to decreased medication compliance, poor metabolic control, higher rates of health problems, a reduction in patient's quality of life, an increase in healthcare use and expense, an increase in impairment and loss of productivity, are linked to high rates of morbidity and mortality [15].

Regarding the prevalence of depression and anxiety, the findings of another study conducted in Malaysia are consistent with our findings. According to the study, 9% of the subjects tested positive for anxiety, while 20% matched the criteria for depression [16]. Our study's prevalence of depression and anxiety was similar to that of prior

investigations, with prevalence estimates ranging from 18 to 30 percent [17-19].

A few studies have reported much higher rates of anxiety and depression in individuals suffering from T2DM. A Malaysian study performed over 169 patients with T2DM reported anxiety and depression in 31.4% and 40.3% of patients [20]. A study in Pakistan reported anxiety in 50.7% of patients and 49.2% of patients with depression [21].

The discrepancies in the rates of depression and anxiety between our study and that of the other studies may be attributed to the socio-cultural differences of different populations, differences in screening instruments or sampling methods, and the subject's sample size.

According to our findings, anxiety and depression are more prevalent in females than in males, as reported in previous studies [14, 16, 20, 21]. Disabilities that limit daily duties are consistent predictors of anxiety and depressive feelings. In this population, limitations in everyday function were a critical factor linking diabetes to poor mental health, and the effect looked to be amplified among women who had been diagnosed recently.

Factors related to having or not having a job were more closely linked to anxiety than depression. In a study done in Mexico, anxiety levels among employees and non-employees were identical at 59%. On the other hand, employees have a greater rate of depression (52%) than non-employees (38%) [22]. Employees in Malaysia have higher levels of anxiety and sadness (19% and 18%, respectively) [23].

According to the findings, in contrast to our surveyed community sample, unemployed patients exhibited 28.7% of anxiety symptoms and 19.1% of depressive symptoms. While 15.8% of employed patients experienced anxiety and 12.5% experienced depression, an Ethiopian study discovered that depression affects only 6.5 % of employees [24].

We discovered that the progression of diabetic problems is a common factor linked to depression and anxiety [25]. Ischemic heart disease was linked to increased worry, according to the findings of a study done in Karachi, Pakistan [26]. Furthermore, diabetic nephropathy was linked to a higher rate of anxiety. In Lebanon, similar connections have been identified [27]. Diabetic neuropathic pain affects around 26% of diabetes type 2 people with diabetic neuropathy worldwide. It is notoriously difficult to manage, with many individuals going undiagnosed and untreated, resulting in a lower quality of life. Diabetic neuropathic pain is associated with various illnesses, particularly mental and sleep disturbances, all of which appear to obstruct the disease's manage-

ment and progression [28].

In the current study, we found that cerebrovascular accidents, on the other hand, were linked to an increased risk of depression. This research is comparable to that of Francesco Bartoli and his colleagues [29]. These findings show that anxiety and depression are likely to intensify when the health issues of people with diabetes deteriorate [20].

Our study's strength is that it is a multi-center study with a face-to-face interview for the questionnaire. The study, however, had some limitations. To begin with, this is a cross-sectional study. In spite of diabetic complications were assessed based on the patient's medical history because there was no control group. HADS is only meant to be used as a screening tool. It is not meant to be used to diagnose specific mental illnesses.

It is strongly recommended that diabetes patients undergo screening for co-morbid depression and its associated risk factors. This is due to the high prevalence of depressive disorders among diabetic patients.

Conclusion

Anxiety and depression are prevalent in T2DM patients and are linked to sociodemographic and clinical health variables. People with diabetes will have the best health outcomes if they get the psychological and medical care that works together to make them more self-determined and confident in their ability to control their diabetes.

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