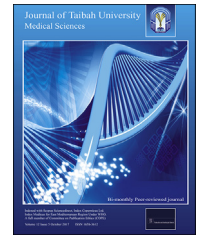




Taibah University  
Journal of Taibah University Medical Sciences

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Original Article

Prevalence and factors associated with anxiety and depression among type 2 diabetes in Qassim: A descriptive cross-sectional study



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Received 6 March 2017; revised 12 April 2017; accepted 16 April 2017; Available online 31 May 2017

المخلص

**أهداف البحث:** تقييم مدى انتشار القلق والاكتئاب وتحديد عوامل الخطر المرتبطة بهما بين مرضى السكري النوع ٢.

**طرق البحث:** أجريت دراسة مقطعية في مركز واحد؛ مركز السكري في مستشفى الملك سعود بمنطقة القصيم وقد شملت العينة ٣٠٠ بالغ مصاب بمرض السكري النوع-٢. حيث تم قياس القلق والاكتئاب باستخدام مقياس المستشفى للقلق والاكتئاب. واستخدام التحليل متعدد المتغيرات والانحدار اللوجستي المتعدد لتقييم التأثيرات المشتركة لعدة عوامل مرتبطة بالقلق والاكتئاب، مع ضبط العوامل الخارجية.

**النتائج:** إجمالاً ٤٣.٦٪ (نطاق الثقة ٣٧.٩-٤٩.٣٪) و ٣٤.٨٪ (نطاق الثقة ٢٩.٠-٤٠.٠٪) مشاركا يعانون من القلق والاكتئاب، على التوالي. وكان القلق أكثر شيوعاً بين المرضى الذين لديهم ضعف في الدعم الاجتماعي، وكان القلق أقل شيوعاً بين المتقاعدين والذين تجاوز عندهم السكري لأكثر من عشر سنوات. وفي المقابل، كان الاكتئاب أكثر شيوعاً بين المرضى الذين يتلقون دعماً اجتماعياً متوسطاً أو قليلاً وأقل شيوعاً لدى المرضى الذين لديهم السكري لأكثر من عشر سنوات.

**الاستنتاجات:** أظهرت هذه الدراسة أن معدل انتشار القلق والاكتئاب عال بين البالغين من مرضى السكري النوع ٢. هذه النتائج يجب أن تنبه الأطباء لاكتشاف وعلاج القلق والاكتئاب كجزء من الرعاية متعددة التخصصات للسكري. هناك حاجة لدراسة مجتمعية أكبر لتحديد حجم هذه المشكلة والعوامل المرتبطة بها.

**الكلمات المفتاحية:** الاكتئاب؛ القلق؛ مرض السكري النوع ٢؛ عوامل الخطورة؛ المملكة العربية السعودية

Abstract

**Objectives:** To assess the prevalence of anxiety and depression and to identify their associated risk factors among people with type 2 diabetes mellitus.

**Methods:** A cross-sectional, single-centre study that included 300 adults with type 2 diabetes mellitus was conducted at The Diabetic Center of King Saud Hospital in the Qassim region. Anxiety and depression were measured by using the Hospital Anxiety and Depression Scale (HADS). Multivariable analysis using multiple logistic regression was conducted to evaluate the combined effect of various factors associated with anxiety and depression, adjusting for confounding variables.

**Results:** Overall, 43.6% (95% CI: 37.9–49.3%) and 34.8% (95% CI: 29–40%) of the participants experienced anxiety and depression, respectively. Anxiety was more common among patients who had poor social support (OR 5.35, P 0.001). Anxiety was less common among retired people (OR 0.36, P 0.048) and those having diabetes for more than ten years (OR 0.39, P 0.006). In contrast, depression was more common among patients who had received moderate (OR 2.47, P 0.031) or low social support (OR 6.62, P 0.000) but less common among those having diabetes for more than ten years (OR 0.44, P 0.022).

**Conclusion:** This study showed that the prevalence of anxiety and depression is high among adults with type 2 diabetes mellitus. These results should alert clinicians to identify and treat anxiety and depression as part of multidisciplinary diabetes care. Larger community-based studies are needed to identify the magnitude of these problems and their related factors.

**Keywords:** Anxiety; Depression; KSA; Risk factors; Type 2 diabetes mellitus

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Peer review under responsibility of Taibah University.



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## Introduction

Type 2 diabetes mellitus (T2DM) is one of the most common chronic problems afflicting the global population.<sup>1</sup> KSA has seen this problem grow at an alarming rate, with approximately one of every five Saudis having diabetes.<sup>2–4</sup> The association of diabetes with psychological disorders is a known entity, with depression and anxiety being the most common.<sup>5,6</sup>

The rates of anxiety and depression among the general population in KSA are between 16 and 40%.<sup>7,8</sup> However, some studies have reported a higher prevalence of mental illnesses among patients with chronic diseases, and the prevalence of mental illnesses among diabetic patients is reported to range between 16 and 50%.<sup>9–11</sup>

Additionally, previous studies have consistently shown low detection rates for such psychiatric comorbidities, resulting in delays in appropriate management<sup>12,13</sup> and thus complicating the health profile of patients and contributing to both morbidity and mortality. An awareness of the size and scale of psychiatric problems associated with T2DM will bridge the existing knowledge gap. The resulting body of knowledge will guide us to develop tools to identify these cases and manage them properly.

T2DM is frequently associated with serious short-term complications such as hypoglycaemia, in addition to disabling long-term complications such as cardiovascular diseases, neuropathies, nephropathies and retinopathies. However, the increased risk for depression is less well-known.<sup>14,15</sup>

Depression may originate as a direct result of neurochemical changes accompanying diabetes, adversely affecting health outcomes. The combination of diabetes and depression is typically associated with a decline in functional abilities and self-care.<sup>16</sup>

The literature shows an association of depression and anxiety with chronic diseases. Long-standing T2DM brings a host of other chronic complications in its wake. Therefore, it is plausible to assume that a correlation exists between the two. Our study explores the linkages of psychiatric problems with T2DM.

The tangible evidence concerning the magnitude of the problem of diabetes in KSA notwithstanding, little is known about the associated psychiatric disorders. Therefore, in this study, we use a cross-sectional survey to evaluate the prevalence of depression and anxiety among T2DM patients and their related risk factors.

## Materials and Methods

### Study design

From September to December 2016, a cross-sectional single-centre study was conducted at The Diabetic Center of King Saud Hospital (DCKSH), Unaiza, Qassim region, KSA.

### Study population & sampling

A sample was drawn from the patients with T2DM between 18 and 60 years of age who receive follow-up treatment from the DCKSH. The sample size was calculated based on the prevalence of 19% for depression and 14% for anxiety using the prevalence from (Engum A, 2005) and (Grigsby, A. B, 2002), with a power of 80% and a non-response rate of 10%. The required sample size was 260. According to our previous experience with similar studies, it is desirable to increase the sample size by 15% to cover refusals and missing data. Therefore, we increased the sample size to 300. The study participants were selected by a systematic random sampling method using medical record numbers in the registration list at the DCKSH, where we took every fifth patient attending the centre.

### Selection of participants

The inclusion criteria for the study were: being Saudi nationals, 18–60 years of age and patients with T2DM for at least one year.

**Table 1: Distribution of study participants by socio-demographic and clinical variables.**

Variables	Frequency	Percent
<b>Age group (n = 298)</b>		
18–40 years	62	20.8
More than 40 years	236	79.2
<b>Gender (n = 300)</b>		
Male	150	50
Female	150	50
<b>Marital status (n = 296)</b>		
Married	226	76.4
Single	30	10.1
Divorced	12	4.1
Widowed	28	9.5
<b>Education (n = 283)</b>		
Primary	45	15.9
Secondary	104	36.7
University	134	47.3
<b>Occupation (n = 296)</b>		
Unemployed/Housewife	101	34.1
Employed	108	36.5
Retired	87	29.4
<b>Income (n = 286) per month</b>		
Less than 5000 SAR	100	35
5000–10,000 SAR	99	34.6
10,000–15,000 SAR	74	25.9
More than 15,000 SAR	13	4.5
<b>Social support (n = 293)</b>		
High	71	24.2
Moderate	164	56
Low	58	19.8
<b>Duration of diabetes (n = 293)</b>		
1–10 years	116	39.6
10–20 years	135	46.1
More than 20 years	42	14.3
<b>Control of diabetes (n = 300)</b>		
Good (less than 7)	79	26.3
Not good (more than 7)	221	73.7

**Instrument**

A self-administered questionnaire that consisted of three sections was used: The first section included items on socio-demographics (gender, age, marital status, education level, monthly income, perceived social support and employment status). The second section assessed anxiety and depression among patients with diabetes by using the Hospital Anxiety and Depression Scale (HADS), originally developed by Zigmond and Snaith [Zigmond AS, 1983], and translated into Arabic and validated among the Saudi population [El Rufaie OE, 1995]. The HADS comprises 14 items, 7 of which measure anxiety (HADS-A) and another 7 measures depression (HADS-D). These items are scored on a four-point Likert scale ranging from 0 (not present) to 3 (considerable). The item scores were summed to provide subscale scores of anxiety and depression, ranging between 0 and 21, and the total summed score ranges from 0 to 42. A higher score represents higher anxiety or depression. The scores are categorized as follows: normal (0–7), mild distress (8–10), moderate distress (11–14) and severe distress (15–21) [Whelan-Goodinson,

2009]. A score of 8 points or more was considered the cut-off point that was suggested by its creators<sup>17,18</sup> and others.<sup>19</sup>

The third part included health factors, namely, the duration of diabetes and diabetes control. DM control was taken from the patients' medical records and considered either good or poor, as indicated by the level of A1C recommended by The American Diabetic Association, with a reasonable A1C goal for many non-pregnant adults being 7%.<sup>20</sup>

**Data analysis**

Analysis was performed using the Statistical Package for Social Sciences (SPSS) (V.22.0, IBM, Armonk, New York, USA). Cross tabulations were performed to present the study participants' depression and anxiety status by socio-demographic and clinical variables. The participants were categorized as either having depression and anxiety or not, using the cut-off points noted above. Binary logistic regression analyses were performed to investigate the association between the depression and anxiety status and the socio-demographic

**Table 2: Depression and anxiety status by demographic, medical and social support variables.**

Variables	Depression		Anxiety	
	No Count (%)	Yes Count (%)	No Count (%)	Yes Count (%)
<b>Age groups</b>				
18–40 years	37 (61.7)	23 (38.3)	27 (43.5)	35 (56.5)
More than 40 years	156 (66.1)	80 (33.9)	140 (60.1)	93 (39.9)
<b>Gender</b>				
Male	104 (69.3)	46 (30.7)	100 (66.7)	50 (33.3)
Female	90 (61.2)	57 (38.8)	67 (45.9)	79 (54.1)
<b>Marital status</b>				
Married	148 (65.8)	77 (34.2)	131 (58.7)	92 (41.3)
Single	20 (69.0)	9 (31.0)	10 (33.3)	20 (66.7)
Divorced	7 (58.3)	(41.7)5	4 (33.3)	8 (66.7)
Widowed	17 (60.7)	11 (39.3)	19 (67.9)	9 (32.1)
<b>Education</b>				
Primary	25 (55.6)	20 (44.4)	23 (52.3)	21 (47.7)
Secondary	66 (63.5)	38 (36.5)	63 (61.8)	39 (38.2)
University	94 (71.2)	38 (28.8)	76 (56.7)	58 (43.3)
<b>Occupation</b>				
Unemployed/Housewife	54 (54.5)	45 (45.5)	40 (40.4)	59 (59.6)
Employee	78 (72.2)	30 (27.8)	59 (55.1)	48 (44.9)
Retired	59 (67.8)	28 (32.2)	66 (75.9)	21 (24.1)
<b>Income</b>				
Less than 5000 SAR	59 (59.6)	40 (40.4)	54 (54.0)	46 (46.0)
5000–10,000 SAR	62 (62.6)	37 (37.4)	52 (53.6)	45 (46.4)
10,000–15,000 SAR	56 (76.7)	17 (23.3)	46 (63.0)	27 (37.0)
More than 15,000 SAR	11 (84.6)	2 (15.4)	9 (69.2)	4 (30.8)
<b>Social support</b>				
High	56 (80.0)	14 (20.0)	42 (60.0)	28 (40.0)
Moderate	109 (66.9)	54 (33.1)	99 (61.1)	63 (38.9)
Low	25 (43.1)	33 (56.9)	22 (37.9)	36 (62.1)
<b>Duration of diabetes</b>				
1–10 years	69 (60.0)	46 (40.0)	50 (43.5)	65 (56.5)
10–20 years	94 (70.1)	40 (29.9)	85 (63.4)	49 (36.6)
More than 20 years	28 (66.7)	14 (33.3)	30 (73.2)	11 (26.8)
<b>Control of diabetes</b>				
Good (less than 7)	56 (70.9)	23 (29.1)	45 (57.0)	34 (43.0)
Not good (more than 7)	138 (63.3)	80 (36.7)	122 (56.2)	95 (43.8)

and clinical variables. Odds ratios, both unadjusted and adjusted, were reported with 95% confidence intervals.

## Results

Most of our respondents were more than 40 years of age, married and had poorly controlled diabetes. More details about the participants' socio-demographic and clinical information are presented in Table 1.

Based on our findings, the prevalence of depression and anxiety among type 2 diabetic patients was estimated at 34.8% (95% CI: 29–40%) and 43.6% (95% CI: 37.9–49.3%), respectively. Table 2 shows that depression and anxiety were observed more among younger patients, females, unmarried (divorced or single) patients, less educated patients, patients who were unemployed/housewives, and those were receiving low social support.

Table 3 shows the predictors of anxiety among diabetics using multivariable logistic regression. We observe a significant association between individuals' anxiety status and occupation, perceived social support and years living with diabetes. The results demonstrate that the odds of being diagnosed as having anxiety on the HADS were

greater among patients who receive low social support than among those who receive high social support (AOR 5.35; 95% CI: 2.03–14.06). On the other hand, we also observe that the odds of having anxiety, according to the HADS, is lower among those who are retired (AOR 0.36; 95% CI: 0.13–0.99) than among who are unemployed and housewives. Our results also show that patients having diabetes for 10–20 years have lower odds of having anxiety than those having diabetes for 10 years or less (AOR 0.39; 95% CI: 0.2–0.76).

Table 4 shows the predictors of depression among diabetics using multivariable logistic regression. Significant associations are observed between the study participants' depression status and perceived social support and years living with diabetes. The results demonstrate that the odds of having depression are 2.47 (95% CI: 1.09–5.62) times greater among those who receive moderate social support and 6.62 (95% CI: 2.51–17.50) times greater among those who receive low social support compared to the people who receive high social support. Our findings also show that patients having diabetes for 10–20 years are less likely (AOR 0.16; 95% CI: 0.06–0.44) to suffer from depression than those having diabetes for 10 years or less.

**Table 3: Independent predictors of anxiety among diabetics.**

Variables	Odds ratio (95% CI)	P value	Adjusted odds ratio (95% CI)	P value
<b>Age groups</b>				
18–40 years				
More than 40 years	0.51 (0.29–0.90)	0.021	1.83 (0.69–4.82)	0.224
<b>Gender</b>				
Male				
Female	2.36 (1.47–3.77)	0.000	1.96 (0.95–4.04)	0.069
<b>Marital status</b>				
Married				
Single	2.85 (1.27–6.37)	0.011	2.50 (0.73–8.55)	0.144
Divorced	2.85 (0.83–9.74)	0.095	1.84 (0.45–7.54)	0.400
Widower	0.67 (0.29–1.56)	0.356	0.50 (0.14–1.83)	0.298
<b>Education</b>				
Primary				
Secondary	0.68 (0.33–1.38)	0.286	0.67 (0.25–1.83)	0.436
University	0.84 (0.42–1.66)	0.607	0.94 (0.30–2.92)	0.911
<b>Occupation</b>				
Unemployed/Housewife				
Employee	0.55 (0.32–0.96)	0.035	0.88 (0.33–2.36)	0.798
Retired	0.22 (0.11–0.41)	0.000	0.36 (0.13–0.99)	0.048
<b>Income (n = 283)</b>				
Less than 5000 SAR				
5000–10,000 SAR	1.02 (0.58–1.78)	0.956	1.34 (0.56–3.24)	0.512
10,000–15,000 SAR	0.69 (0.37–1.28)	0.237	0.85 (0.27–2.75)	0.791
More than 15,000 SAR	0.52 (0.15–1.81)	0.304	0.73 (0.14–3.88)	0.713
<b>Social support</b>				
High				
Moderate	0.95 (0.54–1.69)	0.874	1.18 (0.56–2.48)	0.669
Low	2.45 (1.20–5.01)	0.014	5.35 (2.03–14.06)	0.001
<b>Duration of diabetes</b>				
1–10 years				
10–20 years	0.44 (0.27–0.74)	0.002	0.39 (0.20–0.76)	0.006
More than 20 years	0.28 (0.13–0.62)	0.002	0.36 (0.11–1.11)	0.075
<b>Control of diabetes</b>				
Good (less than 7)				
Not good (more than 7)	1.03 (0.61–1.73)	0.909	0.86 (0.45–1.64)	0.640

**Table 4: Independent predictors of depression among diabetics.**

Variables	Odds ratio (95% CI)	P value	Adjusted odds ratio (95% CI)	P value
<b>Age groups</b>				
18–40 years	<b>Reference</b>			
More than 40 years	0.83 (0.46–1.48)	0.520	0.95 (0.36–2.50)	0.913
<b>Gender</b>				
Male	<b>Reference</b>			
Female	1.43 (0.87–2.31)	0.143	1.00 (0.47–2.11)	0.994
<b>Marital status</b>				
Married	<b>Reference</b>			
Single	0.87 (0.38–1.99)	0.733	0.45 (0.13–1.58)	0.213
Divorced	1.37 (0.42–4.47)	0.599	1.26 (0.31–5.07)	0.749
Widower	1.24 (0.56–2.79)	0.596	0.67 (0.22–2.09)	0.492
<b>Education</b>				
Primary	<b>Reference</b>			
Secondary	0.72 (0.35–1.47)	0.364	1.03 (0.41–2.59)	0.942
University	0.51 (0.25–1.02)	0.055	1.23 (0.41–3.70)	0.714
<b>Occupation</b>				
Unemployed/Housewife	<b>Reference</b>			
Employee	0.46 (0.26–0.82)	0.009	0.50 (0.18–1.39)	0.184
Retired	0.57 (0.31–1.04)	0.065	0.59 (0.21–1.60)	0.296
<b>Income</b>				
Less than 5000 SAR	<b>Reference</b>			
5000–10,000 SAR	0.88 (0.50–1.56)	0.662	1.04 (0.46–2.37)	0.926
10,000–15,000 SAR	0.45 (0.23–0.88)	0.020	0.51 (0.16–1.60)	0.248
More than 15,000 SAR	0.27 (0.06–1.28)	0.098	0.46 (0.07–3.22)	0.435
<b>Social support</b>				
High	<b>Reference</b>			
Moderate	1.98 (1.01–3.87)	0.046	2.47 (1.09–5.62)	0.031
Low	5.28 (2.41–11.55)	0.000	6.62 (2.51–17.50)	0.000
<b>Duration of diabetes</b>				
1–10 years	<b>Reference</b>			
10–20 years	0.64 (0.38–1.08)	0.094	0.44 (0.22–0.89)	0.022
More than 20 years	0.75 (0.36–1.58)	0.447	0.38 (0.13–1.11)	0.077
<b>Control of diabetes</b>				
Good (less than 7)	<b>Reference</b>			
Not good (more than 7)	1.41 (0.81–2.47)	0.226	1.32 (0.68–2.57)	0.417

## Discussion

The main finding of the study was that among the study participants attending the diabetic centre in Unaiza, the Qassim region, nearly half (43.6%) were positive for anxiety and more than one-third (34.8%) were found to be positive for depression. Significant associations between the study participants' depression status and their perceived social support and years living with diabetes were observed. Our results also showed a significant association between individuals' anxiety status and occupation, perceived social support and years living with diabetes. The prevalence of anxiety was almost double that of depression. These findings concur with those from other studies.<sup>21–23</sup>

Identifying the mental problems and their related factors among diabetic patients will be of great help for practitioners in managing these types of cases. Previous studies have shown that people with diabetes have a two-fold increased risk for depression.<sup>14,15</sup> For this reason, the International Diabetes Federation (IDF) Global Guideline for Type 2 Diabetes recommends assessing patients' psychological status periodically.<sup>24</sup> A local study has stated that periodic psychological assessment should be part of the clinical evaluation of diabetic patients.<sup>25</sup>

More than one-third of our samples were depressed, though other local studies have reported different figures; Al-Khathami et al. have reported that 16% of diabetics have depression.<sup>8</sup> In other studies, the percentages of diabetics reported to be depressed have been 49.6%,<sup>10</sup> 37.9%<sup>9</sup> and 61.8%.<sup>26</sup> Another study in the Gulf region (UAE) has shown that approximately 12.5% of diabetics had possible mental health problems.<sup>27</sup> These variations in the results could be related to the methodology of these studies. A larger and well-designed study using the most appropriate scale could define the problem more accurately.

However, similar figures have been shown in other parts of the world. A study in Malaysia shows that the rates for anxiety and depression were 31.4% and 40.3%, respectively<sup>28</sup>; in the UK, the rates for anxiety and depression were 42%<sup>29</sup> and, in Ireland, 32% and 22%, respectively.<sup>30</sup>

In this study, although not significant, depression and anxiety were observed more among females and unmarried (divorced or single) individuals. In contrast, Hawamdeh et al. have reported that the prevalence of depression, as a comorbidity of T2DM among Arab women in Arab countries, is very significant.<sup>31</sup> Additionally, a local study has also shown that unmarried patients were three times more depressed than married patients.<sup>10</sup>

Our findings revealed significant associations between the status of anxiety and depression and the level of social support. This result is in agreement with other studies.<sup>32,33</sup> These results could be easily explained by the fact that living with a chronic lifelong disease that has a complex symptomatology and multiple complications certainly requires a high level of social and family support; accordingly, missing this support will have some psychological impact.<sup>34</sup>

It seems that the diabetic patients in our sample are psychologically coping with time. A study in older men has shown that they could have more depression later in their lives.<sup>35</sup> Other evidence has suggested that diabetes and depression could exacerbate each other, with each condition acting as a risk factor in the development of the other.<sup>36</sup> An increase in the duration of diabetes is known to significantly increase the risk of developing complications and health care expenditures; as a result such patients are more prone to develop psychological illnesses.<sup>37,38</sup> Caution is warranted here because of our study design, given that it cannot show such a relation with time.

The present study has shown that anxiety is lower among those who are retired, which is not in agreement with other studies.<sup>38</sup> This could be because patients in KSA do not have to worry about treatment expenses.

The study has some limitations. A single-centre, hospital-based study with a small sample could not provide reliable data about prevalence. Additionally, being a cross-sectional study, it could not assess the temporal relationships between anxiety, depression and other diabetes-related variables. However, it may yield likely results concerning factors related to depression and anxiety among individuals with type 2 diabetes mellitus.

## Conclusion

The study has shown a significant association between anxiety and depression and T2DM. Several factors can facilitate the development of these conditions, such as the absence of social support. To improve their quality of life, all patients with T2DM should be routinely screened for depression and anxiety.

## Conflict of interest

The author has no conflict of interest to declare.

## Acknowledgements

The work could not be completed without the help of N. Taghreed Al Habardi and the other team members at the DCKSH, who collected the data from the study centre.

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**How to cite this article:** Al-Mohaimeed AA. Prevalence and factors associated with anxiety and depression among type 2 diabetes in Qassim: A descriptive cross-sectional study. *J Taibah Univ Med Sc* 2017;12(5):430–436.