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

Abdulrahman A. Al-Mohaimed, ABFM

Department of Family and Community Medicine, College of Medicine, Qassim University, Buraidah, KSA

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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 e 49.3%) and 34.8% (95% CI: 29 e 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
Introduction

Type 2 diabetes mellitus (T2DM) is one of the most common chronic problems afflicting the global population. KSA has seen this problem grow at an alarming rate, with approximately one of every five Saudis having diabetes. The association of diabetes with psychological disorders is a known entity, with depression and anxiety being the most common. The rates of anxiety and depression among the general population in KSA are between 16 and 40%. 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%. Additionally, previous studies have consistently shown low detection rates for such psychiatric comorbidities, resulting in delays in appropriate management 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. 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.

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 |
|----------------------------|-----------|---------|
| Age group (n = 298)        |           |         |
| 18–40 years                | 62        | 20.8    |
| More than 40 years         | 236       | 79.2    |
| Gender (n = 300)           |           |         |
| Male                       | 150       | 50      |
| Female                     | 150       | 50      |
| Marital status (n = 296)   |           |         |
| Married                    | 226       | 76.4    |
| Single                     | 30        | 10.1    |
| Divorced                   | 12        | 4.1     |
| Widowed                    | 28        | 9.5     |
| Education (n = 283)        |           |         |
| Primary                    | 45        | 15.9    |
| Secondary                  | 104       | 36.7    |
| University                 | 134       | 47.3    |
| Occupation (n = 296)       |           |         |
| Unemployed/Housewife       | 101       | 34.1    |
| Employed                   | 108       | 36.5    |
| Retired                    | 87        | 29.4    |
| Income (n = 286) per month |           |         |
| 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     |
| Social support (n = 293)    |           |         |
| High                       | 71        | 24.2    |
| Moderate                   | 164       | 56      |
| Low                        | 58        | 19.8    |
| Duration of diabetes (n = 293) |       |         |
| 1–10 years                 | 116       | 39.6    |
| 10–20 years                | 135       | 46.1    |
| More than 20 years         | 42        | 14.3    |
| Control of diabetes (n = 300) |         |         |
| Good (less than 7)         | 79        | 26.3    |
| Not good (more than 7)     | 221       | 73.7    |
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 [17,18] and others [19].

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% [20].

**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 (%) |
| **Age groups** | | | | |
| 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) |
| **Gender** | | | | |
| 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) |
| **Marital status** | | | | |
| 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 (33.3) | 8 (66.7) |
| Widowed | 17 (60.7) | 11 (39.3) | 19 (67.9) | 9 (32.1) |
| **Education** | | | | |
| 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) |
| **Occupation** | | | | |
| 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) |
| **Income** | | | | |
| 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) |
| **Social support** | | | | |
| 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) |
| **Duration of diabetes** | | | | |
| 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) |
| **Control of diabetes** | | | | |
| 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: 29.4–40%) 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.

| Variables                  | Odds ratio (95% CI) | P value | Adjusted odds ratio (95% CI) | P value |
|---------------------------|---------------------|---------|-----------------------------|---------|
| **Age groups**            |                     |         |                             |         |
| 18–40 years               |                     |         |                             |         |
| More than 40 years        | 0.51 (0.29–0.90)    | 0.021   | 1.83 (0.69–4.82)            | 0.224   |
| **Gender**                |                     |         |                             |         |
| Male                      | 2.36 (1.47–3.77)    | 0.000   | 1.96 (0.95–4.04)            | 0.069   |
| **Marital status**        |                     |         |                             |         |
| 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   |
| **Education**             |                     |         |                             |         |
| Primary                   | 0.68 (0.33–1.38)    | 0.286   | 0.67 (0.25–1.83)            | 0.436   |
| Secondary                 | 0.84 (0.42–1.66)    | 0.607   | 0.94 (0.30–2.92)            | 0.911   |
| **Occupation**            |                     |         |                             |         |
| 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   |
| **Income (n = 283)**      |                     |         |                             |         |
| 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   |
| **Social support**        |                     |         |                             |         |
| High                      | 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   |
| **Duration of diabetes**  |                     |         |                             |         |
| 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   |
| **Control of diabetes**   |                     |         |                             |         |
| Good (less than 7)        | 1.03 (0.61–1.73)    | 0.909   | 0.86 (0.45–1.64)            | 0.640   |
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.

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.14,15 For this reason, the International Diabetes Federation (IDF) Global Guideline for Type 2 Diabetes recommends assessing patients’ psychological status periodically.24 A local study has stated that periodic psychological assessment should be part of the clinical evaluation of diabetic patients.25

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.8 In other studies, the percentages of diabetics reported to be depressed have been 49.6%,10 37.9%9 and 61.8%.26 Another study in the Gulf region (UAE) has shown that approximately 12.5% of diabetics had possible mental health problems.27 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%, respectively28; in the UK, the rates for anxiety and depression were 42%29 and, in Ireland, 32% and 22%, respectively.30

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.31 Additionally, a local study has also shown that unmarried patients were three times more depressed than married patients.10

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

| Variables          | Odds ratio (95% CI) | P value | Adjusted odds ratio (95% CI) | P value |
|--------------------|---------------------|---------|------------------------------|---------|
| **Age groups**     |                     |         |                              |         |
| 18–40 years        | Reference           |         |                              |         |
| More than 40 years | 0.83 (0.46–1.48)    | 0.520   | 0.95 (0.36–2.50)             | 0.913   |
| **Gender**         |                     |         |                              |         |
| Male               | Reference           |         |                              |         |
| Female             | 1.43 (0.87–2.31)    | 0.143   | 1.00 (0.47–2.11)             | 0.994   |
| **Marital status** |                     |         |                              |         |
| Married            | Reference           |         |                              |         |
| 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   |
| **Education**      |                     |         |                              |         |
| Primary            | Reference           |         |                              |         |
| 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   |
| **Occupation**     |                     |         |                              |         |
| Unemployed/Housewife | Reference          |         |                              |         |
| 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   |
| **Income**         |                     |         |                              |         |
| Less than 5000 SAR | Reference           |         |                              |         |
| 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   |
| **Social support** |                     |         |                              |         |
| High               | Reference           |         |                              |         |
| 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   |
| **Duration of diabetes** |                   |         |                              |         |
| 1–10 years         | Reference           |         |                              |         |
| 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   |
| **Control of diabetes** |                 |         |                              |         |
| Good (less than 7) | Reference           |         |                              |         |
| Not good (more than 7) | 1.41 (0.81–2.47)  | 0.226   | 1.32 (0.68–2.57)             | 0.417   |
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.32,33 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.24

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.35 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.36 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.37,38 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.38 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 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 anxiety and depression and T2DM.

Conflict of interest

The author has no conflict of interest to declare.

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