

Depression in Urban Omani Adults with Type 2 Diabetes

A cross-sectional study

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ABSTRACT: Objectives: This study aimed to identify the prevalence of clinically significant depression among adult Omani patients with type 2 diabetes mellitus (T2DM) and explore potential associations with sociodemographic and clinical variables in this population. **Methods:** This descriptive cross-sectional study was conducted between August 2018 and September 2019 and included 427 Omani T2DM patients from 12 randomly selected government health centres in Muscat, Oman. An Arabic version of the validated Patient Health Questionnaire-9 was administered to the participants via face-to-face interviews to determine the prevalence of depression. **Results:** A total of 111 T2DM patients (response rate: 100%) had depression (26%). The presence of a personal history of depression was the only variable significantly associated with depression ($P < 0.001$). Other sociodemographic and clinical factors including age, gender, duration of diabetes, glycosylated haemoglobin level, mode of diabetes treatment or the presence of diabetes-related complications such as cardiac complications, renal impairment, retinopathy, neuropathy and erectile dysfunction, were not associated with depression, ($P > 0.050$ each). **Conclusion:** This study revealed a high prevalence of depression among urban Omani adults with T2DM and a personal history of depression, which was found to be significantly associated with depression. Therefore, early screening for depressive symptoms is necessary to improve the quality of life of diabetic patients in this region.

Keywords: Depression; Type 2 Diabetes Mellitus; Prevalence; Public Health; Primary Healthcare; Oman.

ADVANCES IN KNOWLEDGE

- Depression was found to be common among urban Omani adults with type 2 diabetes mellitus.
- Moreover, a personal history of depression was the only factor found to be significantly associated with depression in the studied cohort.

APPLICATION TO PATIENT CARE

- In light of these findings, early detection and intervention tools should be implemented in diabetic clinics in Oman in order to help counteract the high prevalence of depression among diabetic individuals and improve their quality of life.

DEPRESSION IS A MENTAL HEALTH DISORDER which commonly manifests as symptoms of low mood or sadness, loss of interest and pleasure in normal activities or surroundings, decreased energy, feelings of guilt or low self-esteem, sleep or appetite disturbances and difficulties concentrating.¹ This public health problem is a significant contributor to the global burden of diseases; according to the World Health Organization (WHO), an estimated 264 million people worldwide are affected by depression.^{1,2} In 2011, results from the World Mental Health Survey indicated that approximately one in 20 people had experienced a depressive episode in the previous year.¹ Indeed, depression has been identified as the third leading cause of disease burden and years lost due to disability worldwide.²

Diabetes mellitus is a chronic metabolic disorder which represents the fourth leading cause of disability globally.² Estimates from the WHO indicate that 422 million adults were affected by diabetes in 2014, with

the global age-standardised prevalence of this disease rising from 4.7% in 1980 to 8.5% in 2014.³ Moreover, both diabetes and diabetes-related complications have a tremendous financial impact, particularly in low- and middle-income countries, both in terms of direct and indirect medical costs and premature mortality as well as productivity loss and labour market effects.^{3,4} While patients with type 2 diabetes mellitus (T2DM) have a 24% increased risk of depression compared to non-diabetic individuals, the mechanisms underlying this relationship are still unclear.^{5,6} In particular, depressive symptoms in diabetic individuals have been associated with worsened glycaemic control, an increased prevalence of diabetes-related complications, increased functional disability, lower adherence to antidiabetic medications, higher health-related costs and increased mortality.^{7–12} The overall prevalence of depression among people with T2DM has been reported to be 27%; moreover, in a meta-analysis of 42 studies comprising 21,351 adults, the prevalence of

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major depression in people with diabetes was 11.4%, while the prevalence of clinically significant depressive symptoms was 31%.¹³

Over the last few decades, the burden of diabetes has risen dramatically in Oman (i.e., from 8.3% in 1991 to 11.6% in 2000).¹⁴ Alarming, the number of individuals living with diabetes in Oman is predicted to further increase by 174% from 128,769 in 2015 to 352,156 in 2050.¹⁵ Depression among those with diabetes would most likely lead to poor adherence to medical treatment, thus further increasing the economic burden of this disease. A previous study showed the overall prevalence of depression to be 8.1% among urban Omani adults attending primary healthcare clinics in Muscat for various reasons; however, while the study highlighted the co-existence of depression with chronic physical illnesses, it failed to show a clear association due to the limited number of subjects with chronic diseases ($P = 0.19$).¹⁶ A meta-analysis revealed depression to be a significant comorbidity among a cohort of Arab women with T2DM, including Omanis.¹⁷

To the best of the authors' knowledge, no studies have yet been conducted in Oman to identify the prevalence of depression among Omani diabetic patients. Hence, this study aimed to determine the prevalence of depression among a population of Omani adults with T2DM attending randomly selected governmental diabetic clinics in an urban region. Additionally, this study aimed to identify associations between depression and sociodemographic and clinical variables in order to inform the development and implementation of early detection and intervention tools so as to improve the quality of life of this group. As the Ministry of Health in Oman provides free treatment to all citizens, the care of diabetes-related complications represents an increasing financial burden. It is, therefore, imperative to conduct local studies for the benefit of policy-planners to further strengthen measures to tackle the rising impact of non-communicable diseases.

Methods

This descriptive cross-sectional study was conducted from August 2018 to September 2019 at a random selection of 12 out of 30 governmental primary healthcare centres in the Muscat Governorate, Oman. All patients with T2DM attending the diabetes clinics of these health centres during the aforementioned period were included. However, patients with major mental illnesses and those who were deaf and mute, currently taking antidepressants, pregnant or less than six months postpartum were excluded from the study.

The necessary sample size was calculated to be 384 for a single proportion using nMaster software, Version 2.0 (Department of Biostatistics, Christian Medical College, Vellore, India), based on a documented depression prevalence rate of approximately 50% and at a confidence level of 95% and relative precision of 5%.¹⁸ However, in order to account for a presumed non-response rate of 10%, the desired sample size was set at 422.

Data were collected from the patients at the selected health centres during face-to-face interviews performed by several trained research assistants. A previously translated Arabic version of the Patient Health Questionnaire (PHQ)-9 was used to assess the prevalence of depression.¹⁹ The original PHQ-9 is a valid and reliable tool for depression screening which focuses on nine specific symptoms and signs of depression based on criteria proposed by the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, including loss of interest/pleasure, low mood/hopelessness, sleeping difficulty, loss of energy, changes in appetite, feelings of guilt/worthlessness, difficulty concentrating, feelings of being slow/restless and suicidal ideation.²⁰ In-line with previous research, a cut-off score of ≥ 10 was considered to indicate the presence of a depressive disorder.²¹ The information provided by the patients during the face-face interviews was subsequently verified with their medical records and medication lists using the standard electronic healthcare software used in Oman.

Data were analysed using the Statistical Package for the Social Sciences (SPSS), Version 23.0 (IBM Corp., Armonk, New York, USA). As appropriate, Chi-squared or Fisher's exact tests were used to compare differences in proportion between groups. A univariate analysis was performed to determine associations between depression and various sociodemographic and clinical variables. All statistical tests were two-sided. A P value of <0.05 was considered statistically significant.

Ethical approval for this study was obtained from the regional research committee of the Directorate General of Planning and Studies at the Ministry of Health in Muscat (MH-DGSP-14/2018). The purpose of the study was explained beforehand to the patients, all of whom provided written informed consent prior to participation.

Results

A total of 427 patients (response rate: 100%) with type 2 diabetes mellitus (T2DM) were included in the study. According to their total PHQ-9 scores, 111

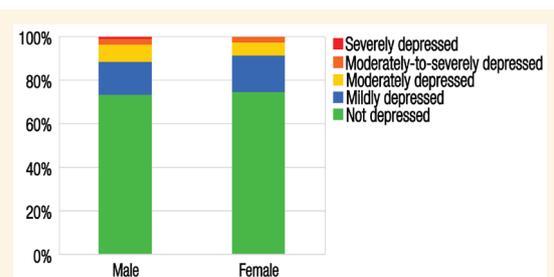


Figure 1: Chart showing the prevalence and severity of depression according to gender among urban Omani adults with type 2 diabetes from Muscat Governorate, Oman (N = 427).

patients (26%) were found to have depression, while 316 (74%) were not depressed. Among those who were depressed, 55 (49.5%) were male and 56 (50.4%) were female, whereas 152 (48.1%) were male and 164 (51.9%) were female in the non-depressed group [Figure 1].

Depression was most prevalent among those aged 30–40 years and least prevalent among those aged 51–60 years (36.2% versus 21.3%). However, the presence of a personal history of depression was the only variable significantly associated with depression ($P < 0.001$). No significant associations were observed between other sociodemographic characteristics and depression, including gender ($P = 0.79$) or age ($P = 0.056$) [Table 1].

In terms of clinical characteristics, the rate of depression was highest among patients who had had diabetes for more than 10 years (27.5%). However, the difference between the two groups was not statistically significant ($P = 0.54$). Depression was also not significantly associated with diabetes control as measured by the glycated haemoglobin (HbA1C) level ($P = 0.06$). Similarly, no significant associations were noted between depression and other clinical factors, such as the presence of various diabetes-related complications, body mass index or mode of anti-hyperglycaemic treatment [Table 2].

Discussion

Depression can be reliably diagnosed and treated in primary care settings, with standard treatment consisting of basic psychological support combined with antidepressant medications or psychotherapy, such as cognitive behavioural therapy, interpersonal psychotherapy or problem-solving treatment.²² However, many primary care patients presenting with multiple disorders including depression often go undiagnosed; moreover, even if depression is recognised, treatment is usually prioritised for other diseases.²³ Results from the World Health Survey

Table 1: Prevalence of depression according to demographic characteristics among urban Omani adults with type 2 diabetes from Muscat Governorate, Oman (N = 427)

Characteristic	Total	n (%)		P value
		Depressed (n = 111)	Not depressed (n = 316)	
Age in years				0.056
30–40	47	17 (36.2)	30 (63.8)	
41–50	89	29 (32.6)	60 (67.4)	
51–60	127	27 (21.3)	100 (78.7)	
>60	164	38 (23.2)	126 (76.8)	
Gender				0.79
Male	207	55 (26.6)	152 (73.4)	
Female	220	56 (25.5)	164 (74.5)	
Education level				0.92
Illiterate	181	44 (24.3)	137 (75.7)	
Primary	98	26 (26.5)	72 (73.5)	
Secondary	93	26 (28.0)	67 (72.0)	
University and above	55	15 (27.3)	40 (72.7)	
Marital status				0.64
Single	19	9 (47.4)	10 (52.6)	
Married	311	75 (24.1)	236 (75.9)	
Divorced	23	9 (39.1)	14 (60.9)	
Widowed	74	18 (24.3)	56 (75.7)	
Presence of parental consanguinity				0.14
None	261	76 (29.1)	185 (70.9)	
First-degree	119	27 (22.7)	92 (77.3)	
Second-degree	47	8 (17.0)	39 (83.0)	
Employment status				0.72
Employed full-time	94	25 (26.6)	69 (73.4)	
Employed part-time	27	10 (37.0)	17 (63.0)	
Unemployed	9	3 (33.3)	6 (66.7)	
Business owner	17	4 (23.5)	13 (76.5)	
Housewife	173	40 (23.1)	133 (76.9)	
Retired	107	29 (27.1)	78 (72.9)	
Personal history of depression				0.00
Yes	51	33 (64.7)	18 (35.3)	
No	376	78 (20.7)	298 (79.3)	
Family history of depression				0.57
Yes	39	17 (43.6)	22 (56.4)	
No	388	94 (24.2)	294 (75.8)	
Family history of major disability or illness				0.05
Yes	64	29 (45.3)	35 (54.7)	
No	363	82 (22.6)	281 (77.4)	
Regular physical activity				0.098
Yes	162	42 (25.9)	120 (74.1)	
No	265	69 (26.0)	196 (73.9)	
Smoking status				0.11
Smoker	35	13 (37.1)	22 (62.9)	
Non-smoker	392	98 (25.0)	294 (75.0)	

Table 2: Prevalence of depression according to clinical characteristics among urban Omani adults with type 2 diabetes (N = 427)

Characteristic	Total	n (%)		P value
		Depressed (n = 111)	Not depressed (n = 316)	
Duration of DM in years				0.54
<1	31	6 (19.4)	25 (80.6)	
1–5	134	35 (26.1)	99 (73.9)	
6–10	102	26 (25.5)	76 (74.5)	
>10	160	44 (27.5)	116 (72.5)	
HbA1C in %				0.06
≤7	182	43 (23.6)	139 (76.4)	
7.1–8.9	149	34 (22.8)	115 (77.2)	
≥9	96	34 (35.4)	62 (64.6)	
Body mass index in kg/m²				0.35
≤25	99	25 (25.3)	74 (74.7)	
26–29	136	30 (22.1)	106 (77.9)	
≥30	192	56 (29.2)	136 (70.8)	
Mode of DM treatment				0.24
Oral	314	76 (24.2)	238 (75.8)	
Injection	39	10 (25.6)	29 (74.4)	
Oral plus injection	74	25 (33.8)	49 (66.2)	
Complications*				
Diabetic foot	14	4 (28.6)	10 (71.4)	0.81
Cardiac or vascular	61	17 (27.9)	44 (72.1)	0.72
Renal impairment	73	21 (28.8)	52 (71.2)	0.61
Neuropathy	22	7 (31.8)	15 (68.2)	0.52
Retinopathy	105	28 (26.7)	77 (73.3)	0.86

DM = diabetes mellitus; HbA1c = glycated haemoglobin.

*Some participants had no complications while others had more than one complication.

confirmed that depression had a stronger negative influence on health status compared to other chronic diseases; as such, the timely diagnosis and treatment of depressive disorders is imperative.²⁴

The current study found the rate of depression to be 26% among adult Omani patients with T2DM attending urban primary health centres. Other studies conducted in the Gulf Cooperation Council (GCC) region have reported similar findings. For instance, Nasser *et al.* reported a comparable rate (33%) among primary care diabetic patients in Bahrain.²⁵

Alzahrani *et al.* observed the rate of depression to be 33.8% among 450 patients with T2DM attending primary health centres in western Saudi Arabia, with similar findings reported in central Saudi Arabia (34.8%).^{26,27} Alarming, the prevalence of depression in the present study was more than twice that noted among other urban Omani adults attending primary health clinics (26% versus 8.1%).¹⁶ A meta-analysis also revealed an increased prevalence of depression among diabetic patients compared to the general population (31% versus 11%).¹³

However, much higher prevalence rates of depression have been reported among other diabetic populations in GCC countries. For instance, in eastern Saudi Arabia, the prevalence of depression among individuals with T2DM was 49.6%, with depression significantly associated with gender, marital status and diabetes-related complications.¹⁸ In addition, a study conducted in southern Saudi Arabia reported 37.6% of those with T2DM to be depressed, a finding which was also significantly associated with complications.²⁸ In contrast, in the United Arab Emirates (UAE), Sulaiman *et al.* found the prevalence of depression or anxiety to be only 12.5% among T2DM patients attending diabetes clinics at primary care centres or hospitals in Sharjah; however, this study utilised the Kessler Psychological Distress scale rather than the PHQ-9 tool to assess mental health status.²⁹ The differing prevalence rates of depression could be explained by variations in study methods and sample characteristics.

In the current study, various sociodemographic factors—including age, gender, educational level, marital status, monthly income and a family history of major illness—were not found to have a significant influence on the rate of depression. Albasheer *et al.* reported similar findings in Saudi Arabia.²⁸ No significant associations between depression and clinical variables such as diabetes duration were observed in the present study. This is consistent with results reported by studies from eastern and southern Saudi Arabia.^{19,28} This could be attributed to cultural, religious and ethnic differences. The current study also showed no significant associations with diabetes control (as represented by HbA1C values) or with diabetic micro- and macro-vascular complications. Similar findings were noted by Albasheer *et al.* in southern Saudi Arabia.²⁸ In contrast, Sulaiman *et al.* found the presence of ocular, vascular and neurological diabetes-related complications such as diabetic retinopathy, glaucoma and diabetic foot disease to be significantly associated with psychological symptoms of depression and anxiety among T2DM patients in the UAE.²⁹ Comparable findings were also reported

by other researchers.²⁸ This could be explained by the difference in study settings, as primary care centres usually ensure continuity of care and provide specialised diabetes-related services. This level of medical support could help patients adapt more easily to disease complications, thereby potentially lessening the likelihood of depression.

Overall, the presence of a personal history of depression was the only variable significantly associated with depression in the current study. This could point to an effect of inherited genes on the development of depression. However, no significant associations were noted for other potential genetic factors, such as the presence or absence of consanguinity or a family history of depression. As such, further research is required to confirm these findings. In the meantime, early point-of-care screening is recommended to evaluate the occurrence of depressive symptoms among diabetic individuals in Oman in order to improve the quality of life of this patient group.

In terms of limitations, the present study was conducted in a single governorate of Oman, thereby hindering generalisation of the results. Further studies involving additional patients attending primary health clinics in other parts of the country are necessary. Moreover, the PHQ-9 questionnaire used in the study was not the latest version of this tool; nevertheless, this version was used in order to compare findings with previous studies available in the existing literature. Additionally, as a multivariate regression analysis was not conducted, the study could only identify associations between variables and potential confounders could not be ruled out. In addition, while the information provided by the patients during the face-to-face interviews was corroborated with their medical records, it is possible that the findings were subject to self-reporting bias. Finally, all of the subjects consisted of diagnosed T2DM cases with health issues of sufficient severity to involve seeking treatment at a clinic. Additional studies may be necessary to determine whether depression is similarly high among undiagnosed diabetics in the general population or among those with less severe or overt symptoms. Despite these limitations, this study is the first in the country to identify the prevalence of depression among Omani diabetic patients. This information would be of use in the development and implementation of early detection and intervention tools to help counteract the high prevalence of depression in this group.

Conclusion

In primary care settings, depression among patients with type 2 diabetes mellitus (T2DM) often goes

unnoticed and, therefore, untreated. This study revealed a fairly high prevalence of depression among a cohort of urban Omani adults with T2DM, with a personal history of depression found to be the only variable significantly associated with depression in this group. Accordingly, early screening for depressive symptoms is highly recommended in order to improve the quality of life of these patients.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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AUTHORS' CONTRIBUTION

SHS performed the literature review. SHS and TG collected the data. SJ analysed the results. SHS drafted the manuscript. All authors approved the final version of the manuscript.

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