

Depression among Type 2 Diabetic Patients in Al-Eskan Avenue in Makkah, 2010

Trabulsi FA, Almasaodi KA

Directorate of Public Health, Makkah, Saudi Arabia

Correspondence to: Trabulsi FA, SBFM
Directorate of Public Health, Makkah, Saudi Arabia
Mobile: 00966567000223, E-mail: drfadel2007@hotmail.com

ABSTRACT

Background: The rate of depression in people with diabetes is much higher than in the general population. Depression could affect patients' quality of life. Such effects may be due to alterations in diet, constant dependence on medication, short and long-term side effects and the burden of costs.

Objectives: To determine the prevalence of depression among type 2 diabetic patients and its associated factors in Al-Eskan avenue in Makkah.

Methodology: It is a cross-sectional community-based study included a randomly selected sample of diabetic type 2 patients reside in Al-Eskan avenue in Makkah, who were registered at Al-Eskan PHC. Data collected by the investigator through home visits using self-administered questionnaire. The Arabic version of Becks Depression Inventory was utilized for diagnose of depression.

Results: The current study included 136 diabetic patients of type 2. Males represent 58.8% while females represent 41.2% of them. The prevalence of depression regardless its severity was 41.9%. Approximately 13.2% and 26.5% of patients had mild and moderate depression respectively. Only 2.2% of them had severe depression. More than half of them (58.1%) had no depression. The prevalence of depression was significantly more reported among older, low-income, chronically diseased, complicated and uncontrolled diabetic patients.

Conclusion: Diabetes type 2 appears to increase the risk of developing depression, therefore early detection and treatment intervention provide the best protective mechanisms available against the effects of depression on diabetic outcomes, and a psychological service provision for people with diabetes is needed.

Keywords: Depression; Type 2 diabetes; BDI; Saudi Arabia

Running title: Depression among type 2 diabetic patients

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INTRODUCTION

The lifetime prevalence of major depression in adults is estimated to be 7 to 12 percent in men and 20 to 25 percent in women. The prevalence of depression in patients in primary care settings ranges from 5 to 10 percent. The rates are significantly higher in persons with certain medical conditions, including obesity, diabetes mellitus, cancer, and a history of myocardial infarction. ⁽¹⁾

At any given time, most people with diabetes do not have depression, but studies showed that people with diabetes have a greater risk of depression than people without diabetes. There are no easy answers about why this is true, the stress of daily diabetic management can build. ⁽²⁾ Despite numerous investigations, the underlying patho-physiologies of the metabolic abnormalities are poorly understood. A possible role play the increases counter-regulatory hormone release involved in glucose homeostasis, alterations in the glucose transport function and increased inflammatory activation triggered by depression. ⁽³⁾ Psychiatric disorders could affect patients' quality of life. Such effects may be due to alterations in diet, constant dependence on medication, short and long-term side effects and the burden of costs ⁽⁴⁾

The rate of depression in people with diabetes is much higher than in the general population. The risk of depression increases in women with diabetes. ⁽²⁾

Previous studies have shown individuals who are insulin-resistant may have higher serotonin concentrations and may be more prone to depression and even suicide. Women with diabetes may be more likely to suffer depression because of the clinical diagnosis. ⁽²⁾

A study conducted in kingdom of Bahrain on 2008 showed a positive contribution of type 2 DM to increase depressive and-or anxiety and or stress disorders among the patients examined. ⁽⁵⁾

Another study done in Iran, 2007 reported major depression among (71.8%) of type 2 diabetic patients. ⁽⁶⁾ While in another study done in the United States of America (USA), 1992 showed that depression has potential interactions with diabetes⁽⁷⁾.

In a study done by Al-Mouaalamy NA on 2004-2005 in Jeddah city about prevalence of depression among type 2 diabetic patients attending diabetic clinic at primary health care centers showed that 48% of patients had depression. ⁽⁸⁾ The present study aimed at determining the prevalence of depression and its associated factors among type 2 diabetic patients in Al-Eskan avenue in Makkah.

METHODOLOGY

A cross-sectional community based study included all diabetic type 2 patients in Al-Eskan avenue in Makkah who were registered in Al- Eskan PHC was implemented. The total number of registered diabetic patients was 548, 320 *male and* 228 *female*. The sample size was calculated by using *Epi info* version 6, it was 135 expected frequency 35%, worst acceptable 42% "worst prevalence in general community worldwide." Systematic random sampling technique was applied as follows;

First group of male patients 320 = (58.4%=79n) (every fourth patient was selected randomly).

Second group of female patients 228 = (41.6%=56n) (every fourth patient was selected randomly).

Data collection tools

The Arabic version of Becks Depression Inventory ⁽⁹⁾ was utilized. Beck Depression Inventory (BDI) is a structured instrument composed of 21 categories of symptoms

and attitudes, and describes behavioral manifestations of depression. It assesses the intensity of depressive symptoms. Scores range from 0 to 63, and intensity categories vary from absent or normal (0 to 9), mild (10 to 15), moderate (16 to 19), severe (20 to 29) and extremely severe (30 to 63).⁽¹⁰⁾

Body mass index (BMI) was calculated by dividing the weight in kg by the square of the length in meter. Participants were categorized, based on their BMI values into four subgroups; normal (BMI from 18.5 to 24.9 kg/m²), overweight (BMI from 25 to 29.9 kg/m²), Obese (BMI from 30 to 39.9 kg/m²), and extremely obese (BMI \geq 40 kg/m²).

Self-administrated interviewing questionnaire was used for data collection through home visits. Test re-test reliability was computed and a correlation coefficient of 0.91 has been found. Approval of JPFCM was obtained.

Statistical analysis

Statistical Package for Social Sciences (SPSS) software version 16.0 was used for data entry and analysis. Descriptive statistics (e.g. number, percentage) and analytic statistics using Chi Square tests (χ^2) to test for the association and/or the difference between two categorical variables were applied. P-value equal or less than 0.05 was considered statistically significant.

Depression based on the Arabic version of Beck Depression Inventory scale was treated as dependent variable in multivariate logistic regression analysis. Age, marital status, job status, salary, history of chronic diseases, number of drugs taken, history of insulin use, diabetic complications, follow-up visits, fasting blood glucose and glycosylated hemoglobin were treated as independent categorical variables. Multiple associations were evaluated in multiple logistic regression model based on the backward stepwise selection, where significant variables from the univariate

analysis were included. This procedure allowed the estimation of the strength of the association between each independent variable while taking into account the potential confounding effects of the other independent variables. The covariates were removed from the model if the likelihood ratio statistic based on the maximum likelihood estimates had a probability of > 0.10 . Each category of the predictor variables was contrasted with the initial category (reference category). The adjusted measure of association between risk factors and depression was expressed as the odds ratio (OR) with 95% Confidence Interval (95% CI). Adjusted or crude ORs with 95% CI that did not include 1.0 were considered significant.

RESULTS

1- Age and sex distribution of the participants

The current study included 136 diabetic patients of type 2. Males represent 58.8% while females represent 41.2% of them. The age of males ranged between 32 and 80 years with a mean of 52.54 ± 8.68 years while for females the age ranged between 19 and 67 with a mean of 52.34 ± 7.77 years. This difference in age between males and females was not statistically significant ($P > 0.05$).

2- Socio-demographic characteristics of the participants

Table (1) shows the socio-demographic characteristics of the participated diabetic patients. The majority of them were Saudi (91.9%) and married (86.0%). Only, 3.7% of males were widowed as compared to 19.6% of females while 1.3% of males were divorced as opposed to 5.4% of females. The difference between males and females regarding marital status was statistically significant. Less than half of them (44.4%) had 3 children and slightly more than half of them had 4 children or

more (50.5%). Forty-five percent of males and 14.3% of females had governmental jobs. Approximately two-thirds of females (66.1) were not working and 21.3% of males were retired. The difference between males and females regarding job status was statistically significant ($P>.001$). The salary of more than one-third of the participants (38.2%) was more than 10000 SR.

Table (1): Distribution of the diabetic patients participated in the study according to their socio-demographic characteristics

Socio-demographic characteristics	Males (n=80) No. (%)	Females (n=56) No. (%)	Total (n=136) No. (%)	Chi-square (P)
Nationality				
Saudi	71 (88.8)	54 (96.4)	125 (91.9)	2.61 (0.094)
Non-Saudi	9 (11.2)	2 (3.6)	11 (8.1)	
Marital status				
Single	0 (0.0)	1 (1.8)	1 (0.7)	13.22 (0.004)
Married	76 (95.0)	41 (73.2)	117 (86.0)	
Divorced	1 (1.3)	3 (5.4)	4 (2.9)	
Widowed	3 (3.7)	11 (19.6)	14 (10.3)	
Number of children				
1-2	7 (8.8)	0 (0.0)	7 (5.1)	5.46 (0.064)
3	36 (45.0)	24 (43.6)	60 (44.4)	
4 or more	37 (46.2)	31 (56.4)	68 (50.5)	
Type of job				
Governmental	36 (45.0)	8 (14.3)	44 (32.4)	80.79 (<0.001)
Business	18 (22.5)	11 (19.6)	29 (21.3)	
Technical	9 (11.3)	0 (0.0)	9 (6.6)	
Not working	0 (0.0)	37 (66.1)	37 (27.2)	
retired	17 (21.3)	0 (0.0)	17 (12.5)	
Salary				
<5000 SR	6 (7.5)	12 (21.4)	18 (13.2)	5.62 (0.060)
5000-10000 SR	42 (52.5)	24 (42.9)	66 (48.5)	
>10000 SR	32 (40.0)	20 (35.7)	52 (38.2)	

3- Medical profile of the participants

From table (2), it is obvious that 50% of females as opposed to 27.5% of males had family history of depression with statistically significant difference between them

($p=0.011$). More than half of females (51.8% and 40% of males had history of chronic diseases with no statistically significant difference between them. Most of females (71.4%) were taking three drugs or more as compared to 45.0% of males. This difference was statistically significant ($P=0.005$). Slightly more than one-quarter of the participants from both genders used insulin (26.3% and 6.8% for males and females respectively with no statistically significant difference. Diabetic complications were encountered among more than one-third of the participants from both genders and overall (37.5%, 33.9% and 36.0% for males, females and overall respectively, $P>0.05$).

Table (2): Distribution of the diabetic patients participated in the study according to their medical characteristics

Medical characteristics	Males (n=80) No. (%)	Females (n=56) No. (%)	Total (n=136) No. (%)	Chi-square (P)
F. H. of depression*				
Yes	22 (27.5)	28 (50.0)	50 (36.8)	7.17 (0.011)
NO	58 (72.5)	28 (50.0)	86 (63.2)	
Chronic diseases				
Yes	32 (40.0)	29 (51.8)	61 (44.9)	1.85 (0.220)
NO	48 (60.0)	27 (48.2)	75 (55.1)	
Number of drugs				
1	14 (17.5)	1 (1.8)	15 (11.0)	12.88 (0.005)
2	30 (37.5)	15 (26.8)	45 (33.1)	
3	16 (20.0)	20 (35.7)	36 (26.5)	
4 or more	20 (25.0)	20 (35.7)	40 (29.4)	
Use of insulin				
Yes	21 (26.3)	15 (26.8)	36 (26.5)	0.005 (0.549)
NO	59 (73.7)	41 (73.2)	100 (73.5)	
Diabetic complications				
Yes	30 (37.5)	19 (33.9)	49 (36.0)	0.18 (0.404)
NO	50 (62.5)	37 (66.1)	87 (64.0)	

* Family history of depression

4- Prevalence of depression

The prevalence of depression regardless its severity was 41.9%. Figure (1) displays that 13.2% and 26.5% of the diabetic patients (type 2) had mild and moderate

depression respectively. Only 2.2% of them had severe depression. More than half of them (58.1%) had no depression (based on the Arabic version of Beck Depression Inventory scale).

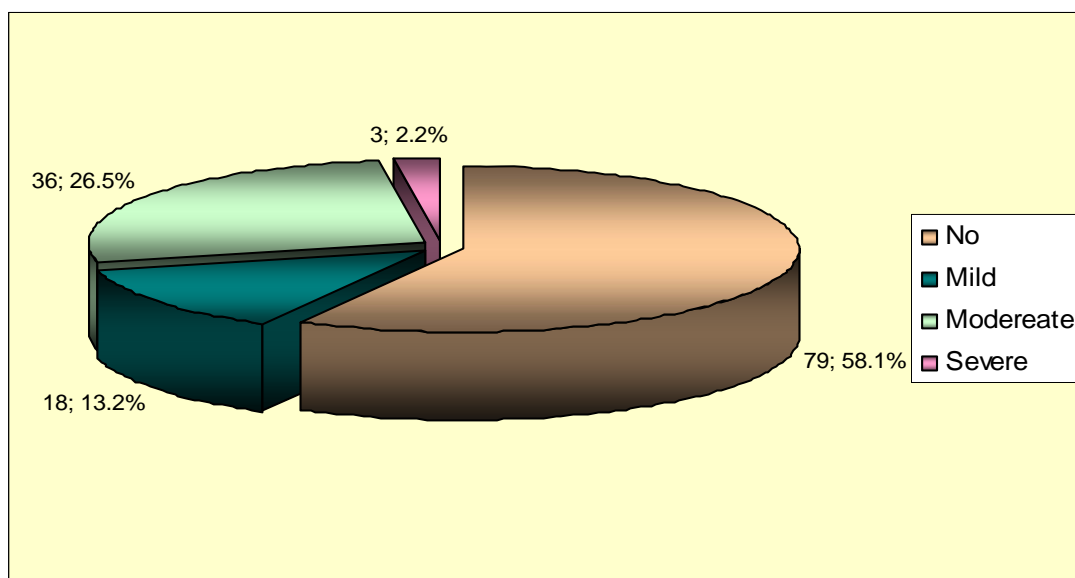


Figure (1): Depression based on Beck scale among participated diabetic patients.

5- Depression and socio-demographic characteristics of type 2 diabetic patients

As obvious from table (3), approximately two-thirds of patients aged over 60 years (65.4%) were depressed as compared to only 31.6% of those at or lower than 45 years of age. This difference was statistically significant ($P=0.024$). The prevalence of depression among male diabetic patients (42.5%) was slightly higher than that of female diabetic patients (41.1%). However, this difference was not statistically significant. Depression was reported among 44.0% of Saudi patients as compared to only 18.2% of non-Saudi patients. However, this difference was not statistically significant ($P=0.119$). Most of divorced and widowed diabetic patients (75.0% and 78.6% respectively) had depression as opposed to only 36.8% of married diabetic patients and this difference was statistically significant ($P=0.009$). The highest prevalence of depression was reported among diabetic patients who had more than

three children (51.5%). However, there was no statistically significant association between number of children and prevalence of depression ($P=0.077$). Most of retired diabetic patients (76.5%) had depression as opposed to 31.0% of those work in free business and 34.1% of governmental workers. These differences were statistically significant ($P=0.028$). The prevalence of depression among diabetic patients who had a salary lower than 5000 Saudi Riyals/month (77.8%) while it was 38.5% among those who had a salary higher than 10000 Saudi Riyals/month. The difference was statistically significant ($p=0.004$).

Table (3): Distribution of the diabetic patients participated in the study according to their socio-demographic characteristics and depression

Socio-demographic characteristics	No depression (n=79) No. (%)	Depression (n=57) No. (%)	Chi-square (P)
Age in years			
≤ 45(19)	13 (68.4)	6 (31.6)	7.49 (0.024)
46-60 (91)	57 (62.6)	34 (37.4)	
> 60 (26)	9 (34.6)	17 (65.4)	
Gender			
males (80)	46 (57.5)	34 (42.5)	0.03 (0.505)
Females (56)	33 (58.9)	23 (41.1)	
Nationality			
Saudi (125)	70 (56.0)	55 (44.0)	2.77 (0.119)
Non-Saudi (11)	9 (81.8)	2 (18.2)	
Marital status			
single (1)	1 (100.0)	0 (0.0)	11.53 (0.009)
married (117)	74 (63.2)	43 (36.8)	
Divorced (4)	1 (25.0)	3 (75.0)	
Widowed (14)	3 (21.4)	11 (78.6)	
Number of children			
One-two (7)	4 (57.1)	3 (42.9)	5.13 (0.077)
Three (60)	41 (68.3)	19 (31.7)	
More than three (68)	33 (48.5)	35 (51.5)	
Job status			
Governmental (44)	29 (65.9)	15 (34.1)	10.91 (0.028)
Business (29)	20 (69.0)	9 (31.0)	
Technical (9)	5 (55.6)	4 (44.4)	
Not-working (37)	21 (56.8)	16 (43.2)	
Retired (17)	4 (23.5)	13 (76.5)	
Salary			
< 5000 SR (18)	4 (22.2)	14 (77.8)	11.12 (0.004)
5000 – 10000 SR (66)	43 (65.2)	23 (34.8)	
> 10000 SR (52)	32 (61.5)	20(38.5)	

6- Depression and Medical profile of type 2 diabetic patients

As shown in table (4), having family history of depression among diabetic patients was associated with higher prevalence of depression (48.0%) than having no family history of depression among them (38.4%). However, this difference was not statistically significant ($P=0.180$). A higher prevalence of depression was reported among diabetic patients who had history of chronic diseases (65.6%) as compared to those without that history (22.7%). This difference was statistically significant ($P<0.001$). The prevalence of depression among diabetic patients steadily increase with the increasing the number of drugs taken (from 6.7% among patients who were taking one drug to 80.0% among those who were taking more than three drugs). This association between number of drug s and prevalence of depression was statistically significant ($P<0.001$). The prevalence of depression among diabetic patients who were using insulin (72.2%) was significantly higher than that among patients who were not taking insulin (31.0%), ($p<0.001$). The prevalence of depression among diabetic patients who had diabetic complications (75.5%) was significantly higher than that among patients who had not complications (23.0%), ($p<0.001$). Prevalence of depression among diabetic patients was significantly associated with the number of follow-up visits. The prevalence of depression was 78.6% among those who had less than 6 follow-up visits as compared to 32.4% among those who had more than 6 follow-up visits. This difference was statistically significant ($P<0.001$). The prevalence of depression among patients who had fasting blood glucose more than 130 mg/dl (49.1%) was significantly higher than that among patients who had fasting blood glucose less than 130 mg/dl (4.5%), ($P<0.001$). The prevalence of depression among patients who had HbA1C level more than 8% (60.3%) was significantly higher than that among patients who had HbA1C level less than 8% (17.5%), ($P<0.001$).

There was no statistically significant association between BMI of studied type 2 diabetic patients and prevalence of depression. The prevalence of depression ranged between 33.3% among overweight patients to 75.0% among normal patients (P=0.341).

Table (4): Distribution of the diabetic patients participated in the study according to their medical profile and depression

Medical profile data	No depression (n=79) No. (%)	Depression (n=57) No. (%)	Chi-square (P)
Family history of depression			
Yes (50)	26 (52.0)	24 (48.0)	1.20 (0.180)
NO (86)	53 (61.6)	33 (38.4)	
History of chronic diseases			
Yes (61)	21 (34.4)	40 (65.6)	25.44 (<0.001)
NO (75)	58 (77.3)	17 (22.7)	
Number of drugs			
one (15)	14 (93.3)	1 (6.7)	40.36 (<0.001)
Two (45)	36 (80.0)	9 (20.0)	
Three (36)	21 (58.3)	15 (41.7)	
More than three (40)	8 (20.0)	32 (80.0)	
Insulin use			
Yes (36)	10 (27.8)	26 (72.2)	18.48 (<0.001)
NO (100)	69 (69.0)	31 (31.0)	
Diabetic complications			
Yes (49)	12 (24.5)	37 (75.5)	35.52 (<0.001)
NO (87)	67 (77.0)	20 (23.0)	
Follow-up visits			
≤ 6(28)	6 (21.4)	22 (78.6)	19.46 (<0.001)
> 6 (108)	73 (67.6)	35 (32.4)	
Fasting blood glucose			
≤ 130 (22)	21 (95.5)	1 (4.5)	15.05 (<0.001)
> 130 (114)	58 (50.9)	56 (49.1)	
Glycosylated haemoglobin			
≤ 8 % (57)	47 (82.5)	10 (17.5)	24.63 (<0.001)
> 8 % (78)	31 (39.7)	47 (60.3)	
BMI			
Normal (4)	1 (25.0)	3 (75.0)	3.35 (0.341)
Overweight (42)	28 (66.7)	14 (33.3)	
Obese (78)	43 (55.1)	35 (44.9)	
Extremely obese (12)	7 (58.3)	5 (41.7)	

Table (5): Risk factors for depression: Results of multivariate Logistic Regression Analyses

Variables	B	Standard error	Adjusted OR	95% Confidence interval
Salary				
> 10000 SR†			1.0	
5000-1000 SR	-0.435	0.510	0.65	0.31-1.96
<5000 SR	1.251	0.786	3.49	2.66-7.25*
Number of drugs				
One †			1.0	
two	1.596	1.267	4.93	0.92-14.02
Three	2.422	1.272	11.27	1.21-21.22*
More than Three	3.712	1.295	40.92	5.21-62.02*
Diabetic complications				
NO†			1.0	
Yes	1.470	0.518	4.35	2.96-9.41*
Follow-up visits				
>6			1.0	
≤6	1.970	0.682	7.170	2.37-11.42*

* $P \leq 0.05$

† Reference category

Variable excluded from the model (not significant): age, marital status, job status, history of chronic diseases, insulin use, fasting blood glucose and glycosylated haemoglobin.

7. Multivariate logistic regression analysis of risk factors for depression

In the multivariate analysis, Patients with lower salary (<5000 SR/month) had almost three-folded risk to develop depression as opposed to those with a salary more than 10000 SR/month (adjusted OR= 3.49, 95%CI= 2.66-7.25). On the other hand, patients presented with diabetic complications had almost four-folded risk to have depression version than those presented without complications (adjusted OR= 4.35, 95%CI= 2.96-9.41). Regarding number of drugs taken, patients treated with three drugs or more than three drugs were at 11-folded and 41-folded higher risk, respectively to have depression as compared to those treated with one drug only (adjusted OR= 11.27, 95%CI= 1.21-21.22 and adjusted OR=40.92, 95%CI=5.21-

62.02 respectively). Patients who had less than 6 follow-up visits were at seven-folded risk of having depression as compared to those who had more than 6 follow-up visits (adjusted OR= 7.170, 95% CI= 2.37-11.42). However, age, marital status, job status, chronic diseases, insulin use, fasting blood glucose and glycosylated haemoglobin were removed from the final logistic regression model (Table 5).

DISCUSSION

Researches have shown that depression is commonly associated with diabetes. People who have both diabetes and depression tend to have more severe symptoms of both diseases, higher rates of work disability and use more medical services than those who only have diabetes alone. ⁽¹¹⁻¹²⁾ Canadian reports showed that diabetic patients with "minor depression" have a 67% greater chance of dying, while those with diabetes and "major depression" have a 130% greater chance of death. ⁽¹³⁾

In the current study, the prevalence of depression among type 2 diabetic patients was 41.9%. In another study conducted in Jeddah, 2005 the prevalence of depression, regardless its severity, was 48% based on Beck Depression Inventory criteria. ⁽⁸⁾ However, the prevalence in the current study is considered being high compared to another study, where the prevalence of depression was 11%. ⁽¹⁴⁾ This difference could be explained by the fact that this study included only major depression according to Diagnostic and Statistical Manual of Mental Disorders, IV (DSM VI) criteria. While in the present study, we included depression as one category, regardless its severity based on BDI scale, for statistical purposes as our sample size was not enough to include only severe depression, which was 2.2%.

In accordance with that has been reported in a study conducted in Jeddah, 2005 ⁽⁸⁾ and a study conducted in Iran ⁽¹⁵⁾ our findings showed a high prevalence of

depression among diabetic patients aged over 60 years. This finding could be attributed to the fact that aging is accompanied by longer duration of the disease and the presence of complications. ⁽¹⁶⁾ Contrary to this finding, other studies reported that younger age was associated with higher prevalence of depression because of more conflicts, stress and irritability. ⁽¹⁴⁾

Lustman PJ et al ⁽⁷⁾ and others ⁽¹⁷⁻¹⁸⁾ reported that female were more prone to have depression than males. The American Diabetic Association has reported the same. ⁽²⁾ In the present study, there was no statistically significant difference between male and female diabetic patients regarding the prevalence of depression. Similarly, Kovacs M, et al ⁽¹⁹⁾ did not find any relation between gender and depression in diabetics.

Similar to has been documented by Al-Mouaalamy NA in Jeddah, 2005 ⁽⁸⁾ in the current study, the prevalence of depression was significantly higher among diabetic patients of lower income. This could be explained by the fact that the low income patients mostly follow-up their disease in governmental primary care hospitals, while those of higher income may seek care in private hospitals or polyclinics where the care could be much better.

Tellez-Zenteno JF and Cardiel MH ⁽²⁰⁾ reported that family history of depression increased the odds of developing depression among diabetic patients. Our study reported the same finding; however, it was not statistically significant.

The significant association of depression with widowed, divorced, retired and chronically diseased diabetic patients could be explained by co-existence of aging and psychological distress factors with diabetes among those patients.

The present study showed that the prevalence of depression among patients with uncontrolled diabetes, as indicated by fasting blood glucose and glycosylated

haemoglobin levels, was higher than those with controlled diabetes. Other studies reported the same finding that uncontrolled diabetes would increase the odds of having depression. ^(16, 20-21) Contrary to that, De Groot M, et al, 2007 ⁽²²⁾ did not observe significant differences in average HbA1C by depression status.

In the present study depression was associated with diabetic complications as in earlier studies. ^(6, 16, 20-21) Peyrot M and Ruben RR ¹⁹⁾ reported that having more than two diabetic complications increased odds ratio of having depression by 2.7 times. In addition, Lustman PJ, et al ⁽¹⁸⁾ reported that the longer the time spent being depressed, the greater the risk of developing retinopathy due to long periods of poor glycaemic control and in the short term, hyperglycaemia. This finding supported by De Groot M, et al ⁽²³⁾ whose meta-analysis indicated that there was a significant association between depression and diabetic retinopathy, neuropathy, nephropathy, sexual dysfunction and macrovascular complications. This means an increase in depressive symptoms with a rise in the severity or number of diabetic complications.

A significant higher prevalence of depression has been shown among diabetic patients used insulin in our study as compared to those not used it. Al-Mouaalamy NA has documented the same finding. ⁽⁸⁾ In addition, Peyrot M and Ruben RR ⁽¹⁹⁾ reported that odds ratio to develop depression was increased by 40% in diabetics ` type 2 who were taking insulin. This finding could be explained by the fact that these patients were uncontrolled and/or had a complicated course of the disease.

In the current study, the prevalence of depression was significantly higher among patients taking more than three drugs (51.5%) as compared to those taking less than three drugs, which slightly lower than the figure that have been reported in Jeddah, 2005 (56.0%). ⁽¹⁰⁾ Both figures could be attributed to the presence of co-morbid diseases and the presence of complications. ⁽²⁰⁾

Limitations to the current study include the cross-sectional nature of the study design, small sample size, conduction of the study in one city that makes it difficult to generalize the findings to other cities and the use of self-report questionnaires, as rates of depression are higher in self-report questionnaires than psychiatric interviews. ⁽²⁴⁾

In conclusion, Diabetes type 2 appears to increase the risk of developing depression, therefore early detection and treatment intervention provide the best protective mechanisms available against the effects of depression on diabetic outcomes, and a psychological service provision for people with diabetes is needed. Depression, regardless its severity was reported among 41.8% of participated diabetic patients according to BDI score. The prevalence of depression was significantly more reported among older, low-income, chronically diseased, complicated and uncontrolled diabetic patients

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