Original Article

# Prevalence and Determinants of Depression among Diabetic Patients,Babel Province, Iraq, 2013-2014


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***Abstract:***

**Background:** Diabetes Mellitus is a complex chronic disease, requiring continuous medical care with multi factorial risk reduction strategies beyond glycemic control. Approximately 30% of patients with types 1 and type 2 diabetes had depression. In addition to the high risk of complications and poor glycemic control, individuals with both diabetes and depression have a 2-3 times greater risk of early mortality than do non-depressed people with diabetes. Early detection of this comorbidity is worthy, especially with simple and relatively valid scales.

**Objectives:** To identify the prevalence and potential risk factors of depression among diabetic patients in Babel province, 2013-2014

**Patient and Method:** A cross-sectional study conducted in Marjan Hospital, diabetes Center, Babel, October, 1st, 2013 to April, 1st, 2014. The study included all patients with Type1 & 2 diabetes excluding pregnant women and those with advanced complications. Data on socio-demographic variables, diabetes characteristics and presence of comorbid diseases and complications was compiled. Self Reporting Questioner (SRQ-20) to identify mental illnesses; DSM-IV criteria for depression and Hamilton-17 Scale, for assessment of severity of depression were used.

**Results:** A total of 466 patients were approached; 91.2% responded. About 90% were of type 2 DM; 37% had depression; 78% had mild and only 4% had severe and very severe depression. Presence of depression was significantly associated with age (P=0.000), marital status (0.036), type of treatment (P=0.001), presence of Ischemic Heart Diseases (P=0.000); retinopathy (0.012), and neuropathy (0.000).

**Conclusions:** More than one third of diabetic patients had depression. Age, type of treatment, and presence of other comorbid conditions or complications were significant risk factors.



**Key words:** Diabetes, Depression, Risk Factors, Prevalence, Iraq.

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## Introduction:

Diabetes Mellitus (DM) refers to a group of metabolic disorders caused by a complex interaction of genetic and environmental factors (1). Besides the considerable human, social and economic losses; the associated permanent health deterioration often results in restricting patients' daily tasks, and makes their performance even impossible (2). The patients usually providing 95% or more of the daily care and they make choices each day that affect and affected by their emotions, thoughts, values, goals, and other psychosocial aspects of living with this chronic disease (3).They have to reorganize their daily schedule, change their habits, and redefine their life goals (4). The quality of life of diabetic patients is usually lower than that of the general population, especially for physical functioning because of the hyper- and hypoglycaemia, exhaustion, sleeping problems, unwanted weight gain, change in lifestyle, type of treatments and their side-effects, and chronic complications (5).

Chronic disease causes permanent psychological changes. Diabetes can lead to frustration, and to a feeling of otherness and solitude that can frequently result in temporary or chronic depression (6). Also, diabetes, by itself, causes the release of many hormones and brain chemicals out of balance that may open a door to depression (7). Epidemiologic studies conducted in both community and medical settings find that people with diabetes are more likely than others to experience depression (8). The co-occurrence of diabetes and depression may be particularly challenging and worthy of greater attention because depression can increase diabetes symptom perception, negatively affect self-care behaviors, and significantly increase disability rates in individuals with diabetes (9). Recent evidence suggests that patients with diabetes and coexisting depression have higher all-cause mortality relative to diabetes patients with no depression (10). Therefore, recognition of depression is important to improve diabetic care because effective treatment is available and cost-effective (11). The objectives of this study are to estimate the prevalence and identify potential determinants of depression among diabetic patients attending DM clinic in Babel province, Iraq, 2013-2014.


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**Patients and Methods:**

Design and setting: This is a cross-sectional study with analytic component. It was conducted in Marjan Center for diabetes, Marjan Medical City, Hilla city, Babil province, Iraq. The data collection was done during the period October, 1st, 2013 to April, 1st, 2014.

Study Population and Sampling: All patients with DM of both sexes were included. A modified systematic sampling method was used, where the first attending patient to the center fulfilling the inclusion criteria was included, and the time needed to complete filling the study questionnaires was used as a system to include the immediately next patient fulfilling the same criteria.

Sample Size: The following formula was used for calculation of the necessary sample size: $n = (z^2 pq) / d^2$; where n = Sample size, z = 1-α/2 percentile of a standard normal distribution 1.96, d = Absolute precision=0.05, p = Expected proportion= 32.2% from Jallo study (12), and q = 1-p. The minimum estimated sample size was 350; 466 were approached to consider the non response and increasing the power of the study.

Inclusion criteria: All Type 1 and 2 DM patients, aged ≥20 years, of both sexes, with history of DM of a minimum of one year, living in Babel and accepted to participate

Exclusion criteria: Patients with Gestational DM; and those with severe neurological diseases (cannot respond to questions), amputation, blindness or on dialysis

Data collection Tools: basic socio-demographic variables, DM history and history of comorbid illnesses and DM complications were compiled using a questionnaire filled through a direct interview.

Mental status of the diabetic patient was assessed using the SRQ20 scale (self reporting questionnaires) that was developed by the WHO and used in many countries. According to previous studies conducted in Iraq, the cut-off point identified used to categories "potential psychiatric cases" and more generally persons with significant psychological distress was seven (13). Those with positive results were assessed for the presence of depression using the DSM-IV scale. This is composed of 9 questions concerned with depressed mood, loss of pleasure, change in weight, sleep, activity, concentration, feeling of guilt and suicidality. Major depression requires the patient to have, for at least two weeks, five or more depressive symptoms present for more than half the days, with at least one symptom being either depressed mood or anhedonia. (14). Those with "depression" were further assessed for the severity of depression using the Hamilton scale. It contains 17 items to be rated (HRSD-17), but four other questions are not added to the total score and are used to provide additional clinical information. Each item on the questionnaire is scored on a 3 or 5 point scale, depending on the item, and the total score is compared to the corresponding descriptor. It is accepted by most clinicians that scores between 0 and 6 do not indicate the presence of depression, scores between 7 and 17 indicate mild depression, scores between 18 and 24 indicate moderate depression, and scores over 24 indicate severe depression. A total HAM-D score of 7 or less after treatment is for most raters a typical indicator of remission (15).

Definition of variables: The independent variables evaluated to explain depression were socio-demographics (age, gender, marital status, level of education, occupation, and residence), smoking habits, characteristics of the disease (type, duration, and type of treatment), complications (retinopathy, neuropathy, nephropathy, and sexual dysfunction for males) and comorbid condition or disease (hypertension, ischemic heart disease, asthma, and thyroid disease).

Statistical Analysis: SPSS version 17 used for data entry and analysis. The prevalence of depression and its 95% confidence interval was calculated. Univariate analysis using Chi square and Fisher's exact probability tests were applied to identify potential risk factors of depression, followed by Logistic Regression Analysis to identify the independent, un-confounded potential risk factors.

Ethical Issues: After granting approval from the concerned health authorities in Babel, informed consent was obtained from the patients after clarifying the objectives of the study. Names were kept anonymous and interviews were conducted with full privacy.

**Results:**

A total of 466 patients were approached; 425 accepted to participate (response rate: 91.2%). Their distribution by socio-demographic and DM characteristics and co-morbid conditions are shown in tables 1 and 2.

**Table 1: Distribution of the study group by socio-demographic characteristics and smoking habit**

| Socio-Demographic Characteristic | | Number (425) | (%) |
|---|---|---|---|
| Age Group | 20-40 | 79 | 18.6 |
| | 41-60 | 267 | 62.8 |
| | 60+ | 79 | 18.6 |
| Gender | Male | 171 | 40.2 |
| | Female | 254 | 59.8 |
| Marital Status | Currently Single | 64 | 15.1 |
| | Married | 361 | 84.9 |
| Level of Education | Illiterate | 61 | 14.4 |
| | Primary | 187 | 44.0 |
| | Secondary | 104 | 24.5 |
| | College+ | 73 | 17.2 |
| Occupation | Unemployed | 291 | 68.5 |
| | Employed | 134 | 31.5 |
| Smoking Habit | Smokers | 63 | 14.8 |
| | Non Smokers | 362 | 85.2 |

**Table 2: Distribution of the study group by DM characteristics and co-morbid conditions**

| Characteristic | | Number (425) | (%) |
|---|---|---|---|
| DM Type | Type 1 | 42 | 10 |
| | Type 2 | 383 | 90 |
| Type of Treatment | Insulin ±OHA* | 204 | 48.0 |
| | OHA | 221 | 52 |
| Duration (Years) | 1-10 | 262 | 61.6 |
| | 11-20 | 116 | 27.3 |
| | 21+ | 47 | 11.1 |
| Complications | Retinopathy | 268 | 63.1 |
| | Neuropathy | 289 | 68.0 |
| | Nephropathy | 29 | 6.8 |
| | Impotence in Men (N=171) | 62 | 36.3 |
| Comorbid Condition | Hypertension | 198 | 46.6 |
| | IHD | 45 | 10.6 |
| | Other** | 19 | 4.2 |

* Oral Hypoglycemic agents
**Asthma and Thyroid diseases

The prevalence of mental disorders was 39.3% (95% CI 34.6-43.9%) and the prevalence of depression was 37.2% (95% CI 32.4-41.5%). A cross classification of patients with and without depression by socio-demographic and DM characteristics and co-morbid conditions is shown in table 3 and 4. The prevalence of depression was highest among those aged 41-60 years (42.4%) and lowest among those aged >60 years (21.6%) (P=0.005). Females had significantly higher proportion of depression (44.4%) compared to males (21.6%) (P=0.001). Depression was significantly higher among currently single (49.2%) than married (36.0%) patients (P=0.46). Also, currently unemployed patients had significantly higher prevalence of depression (42.0%) than employed patients (29.3%) (P=0.013). The prevalence of depression was not significantly different by level of education (P=0.245), smoking status (P=0.051) and type of DM (P=0.49). The prevalence of depression was highest among those with DM for ≥20 years (43.5%) (P=0.023) and among those on insulin ± OHA (49.3%) than those on OHA alone (27.4%) (P=0.001). Apart from nephropathy, the presence of DM complications was significantly associated with depression (P=0.001). Similarly, the presence of IHD, and HT were significantly associated with depression (P=0.001), while presence of other comorbid condition (thyroid diseases or asthma) was not significant. (P=0.313).

**Table 3: Distribution of the study group by depression and the socio-demographic characteristics**

| Characteristic | | Depression | | | | Total (416) | | P Value |
|---|---|---|---|---|---|---|---|---|
| | | Present (158) | | Absent (258) | | | | |
| | | No | % | No | % | No | % | |
| Age Group | 20-40 | 30 | 38.5 | 48 | 61.5 | 78 | 18.8 | 0.005 |
| | 41-60 | 112 | 42.4 | 152 | 57.6 | 264 | 63.5 | |
| | >60 | 16 | 21.6 | 58 | 78.4 | 74 | 17.8 | |
| Gender | Male | 48 | 28.6 | 120 | 71.4 | 168 | 40.4 | 0.001 |
| | Female | 110 | 44.4 | 138 | 55.6 | 248 | 59.6 | |
| Marital Status | Single | 31 | 49.2 | 32 | 50.8 | 63 | 15.1 | 0.046 |
| | Married | 127 | 36.0 | 226 | 64.0 | 353 | 84.9 | |
| Employment Status | Unemployed | 119 | 42.0 | 164 | 58.0 | 283 | 68 | 0.013 |
| | Employed | 39 | 29.3 | 94 | 70.7 | 133 | 32 | |
| Level of Education | Illiterate | 15 | 26.3 | 42 | 73.7 | 57 | 13.7 | 0.245 |
| | Primary | 76 | 41.1 | 109 | 58.9 | 185 | 44.5 | |
| | Secondary | 40 | 39.2 | 62 | 60.8 | 102 | 24.5 | |
| | College+ | 27 | 37.5 | 45 | 62.5 | 72 | 17.3 | |
| Smoking | Smokers | 31 | 49.2 | 32 | 50.8 | 63 | 15.1 | 0.051 |

**Table 4: Distribution of the study group by depression and DM characteristics and presence of complication or comorbid condition**

| Characteristic | | Depression | | | | Total (416) | | P value |
|---|---|---|---|---|---|---|---|---|
| | | Present (158) | | Absent (258) | | | | |
| | | No | % | No | % | No | % | |
| Type of DM | Type 1 | 18 | 42.9 | 24 | 57.1 | 42 | 10.1 | 0.49 |
| | Type 2 | 140 | 37.4 | 234 | 62.2 | 374 | 89.9 | |
| Duration | 1-10y | 91 | 35.7 | 164 | 64.3 | 255 | 61.3 | 0.026 |
| | 11-20y | 41 | 35.7 | 74 | 64.3 | 115 | 27.6 | |
| | 20+ Y | 20 | 43.5 | 26 | 56.5 | 46 | 11.1 | |
| Type of Treatment | Insulin ±OHA | 99 | 49.3 | 102 | 50.7 | 201 | 48.3 | 0.001 |
| | OHA | 59 | 27.4 | 156 | 72.6 | 215 | 51.7 | |
| Complication | Retinopathy | 126 | 48.3 | 135 | 51.7 | 261 | 62.7 | 0.001 |
| | Neuropathy | 137 | 48.6 | 145 | 51.4 | 282 | 67.8 | 0.001 |
| | Nephropathy | 14 | 48.3 | 15 | 51.7 | 29 | 7.0 | 0.24 |
| | Impotence in Men (168) | 29 | 48.3 | 31 | 51.7 | 60 | 35.7 | 0.001 |
| Comorbid Condition | Hypertension | 91 | 46.4 | 105 | 53.6 | 196 | 47.1 | 0.001 |
| | IHD | 31 | 72.1 | 12 | 27.9 | 43 | 10.3 | 0.001 |
| | Other Disease* | 7 | 50 | 7 | 50 | 14 | 3.3 | 0.313 |

* Asthma and thyroid diseases

On application of logistic regression analysis, the following variables were found significant and unconfounded risk factors for presence of depression among DM patients: presence of retinopathy, neuropathy, comorbid IHD, HT, being single, and using insulin ± OHA. Age group over 60 years was associated with less risk. (Table 5)

**Table5:Significant potential determinants of depression among DM patients using Logistic Regression Analysis**

| Variable | P-Value | OR | 95% CI for OR | |
|---|---|---|---|---|
| | | | Lower | Upper |
| IHD | .000 | 4.039 | 1.851 | 8.814 |
| Neuropathy | .000 | 3.717 | 1.989 | 6.946 |
| Retinopathy | .012 | 2.050 | 1.172 | 3.585 |
| Type of Treatment | .001 | 2.254 | 1.397 | 3.637 |
| Marital Status | .036 | 2.051 | 1.050 | 4.009 |
| 61+ Year | .000 | .148 | .059 | .372 |

The assessment of depressed DM patients by severity of depression revealed that 78% had mild depression, 18% had moderate depression and 4% had severe or very severe depression.

**Discussion:**

The prevalence of depression among DM patients in Babel province was 37.2% which is close to the figures reported in a number of neighboring countries (16-19). In the current study a number of factors were found to be associated with depression. Age younger than 60 years was significantly associated with depression. While some studies did not support this finding (20,21) others did (22,23). This age group frequently reported that diabetes had a negative influence on evaluated aspects of life. (24). Females had higher prevalence of depression than males which are consistent with studies conducted in Jordan (25) and Nepal (19) but differs from that done in India (26). Major depression occurs twice as frequently in women than in men (27) and seems to be influenced by estrogen levels (28). Also, the social role attributed to women (passivity, dependence and emotional expression) can possibly allows them to be more emotional and extroversive (29). Single patients had significant higher prevalence of depression, in accordance with some researchers (30, 31), although others disagree (17, 20). Lack of support from a partner or spouse in a stable marriage offers emotional stability as well as shared burden in coping with challenges (32) Educational level showed no significant association with depression in this study, in accordance with many studies (20,33,34). On the other hand, some find an association between low education and depression (18) and explained on the basis that low education diabetics did not seek tertiary care, or on the association with low socioeconomic status. In the present study, depression was more prevalent among currently unemployed than employed patients in consistence with Joseph et al. 2013 (20) but not with Anderson et al. 2001 (35). The apparent association may be due to financial burden imposed by the disease on these groups (20).Considering the characteristics of DM, this study did not find a significant association between depressions and

the type of DM. Similar finding was reported in the meta-analysis study (35) and others (25), although Chaoyang et al, 2008 (36) had different results. Patients on insulin treatment, whether alone or combined with oral hypoglycemic agents had higher prevalence of depression. Similar finding was reported by some studies (22,37), although Raval et al. 2010 showed different finding (33). This could be explained on the basis that the patients find insulin as the most burdensome treatment compared to oral treatment (20). Presence of complications particularly neuropathy and retinopathy was found to be significantly associated with depression. This is consistent with some studies (38, 39,40) although others did not (71,41). One third of diabetic males in this study suffer from impotence, with significant association with depression in consistence with other studies (20,21) as this may affect life quality. The presence of other comorbidities particularly hypertension was significantly associated with depression. Some studies (16,31) reported similar finding but Nasser et al. 2009 (17) did not prove that. IHD was also associated with increasing prevalence of depression in consistence with a number of researchers (17,33), while Poongothai et al, 2011 (39) did not find such association. Additional illnesses will complicate life for more drugs, dietary and physical activity restriction that will manifest as mental distress and depression. Around 22% of the depressed DM patients in this study had moderate to severe depression. Similar study in Nigeria revealed that 32% had moderate to severe depression (34) and in Bangladesh 60% had severe depression (18). In conclusion, more than one third of DM patients had depression; most of them had mild type, and the most important covariates were comorbid Illnesses, presence of complications, using insulin for treatment and younger age group.Since this study is a cross-sectional study, temporal relationship between depression and diabetes cannot be inferred. Similarly, selection bias cannot be excluded as the study was conducted in a specialized center.

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