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Prevalence of Depression among People with Diabetes Attending Diabetes Clinics at Primary Health Settings

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Objective: To study the prevalence of depression among diabetics and to examine the relationship between depression and socio-demographic factors, metabolic control and diabetes complications.

Design: A Cross-Sectional Retrospective Clinical Study.

Setting: Four Primary Health Care Centers.

Method: Two hundred and sixty-four patients were surveyed for the presence of depressive symptoms using Beck Depression Inventory (BDI) scale. In addition, patients' records were reviewed to abstract the following data: socio-demographic characteristics including: age, sex, marital status, level of education, smoking status, Body Mass Index (BMI), duration of diabetes, control of diabetes, use of insulin, presence of diabetic complications, presence of co-morbid conditions including hypertension and hyperlipidemia and the use of antidepressant(s).

Result: Eighty-eight patients (33.3%) scored 16 or more on BDI scale. One hundred and sixty patients (60.6%) of the total sample were females. Statistical significant association was found between high BDI score (≥ 16) and sex, obesity (BMI ≥ 30kg/m^2), nephropathy, ischemic heart disease, and the use of insulin. No significant association between BDI score and metabolic control, duration of diabetes, other socio-demographic factors and diabetic complications was found. It was found that only 6 (2.3%) patients were on antidepressants.

Conclusion: Although about one third of the screened patients were potential cases of depression, the great majority were under-recognized and undertreated. Hence, psychosocial assessment should be part of initial and ongoing evaluation of these patients to improve their quality of life and decrease adverse outcomes.

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Diabetes is a chronic serious metabolic disease, common worldwide. The prevalence is increasing rapidly and the number of affected people is expected to be around 366 million by the year 2030[1]. Bahrain is one of the countries where diabetes is very common[2,3].

Likewise, depression is a major health problem seen in primary care settings[4,5]. It has been found to be more disabling disease than many common chronic medical illnesses seen in

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primary care, including diabetes[6,7]. In fact, depression is expected to be the second leading cause of disability for all age groups by the year 2020[8].

Chronic medical problems increase the prevalence of depression[9]. Diabetes, for instance, was found to double the likelihood of having depression[10,11]. Moreover, depression can have a negative impact on various aspects of diabetic care. For example, depression was found to increase the incidence of both macrovascular and microvascular complications, decrease compliance with medications and healthy lifestyle measures as diet and exercise, increase health care use and expenditures, decrease quality of life, and more important increasing the risk of cardiovascular mortality, which is the leading cause of death in these patients and the second leading cause in Bahrain[12-23].

Therefore, recognition of depression is important to improve diabetic care because effective treatment is available and cost-effective[24-31]. Unfortunately, most of these patients present to primary care physicians, several studies have found that depression is under-recognized and under-treated in primary care settings[4,5,32-35].

In Bahrain, a recent survey found that depression is common among diabetic patients[36]. However, that study was not done in primary care settings where the bulk of these patients are seen. Hence, surveying these patients may highlight a hidden but important problem. To the best of our knowledge, no study was conducted on this particular group of patients in primary care settings.

The aim of this study is to estimate the prevalence of depression among diabetic patients attending primary health care settings and to describe certain socio-demographic characteristics, metabolic control, and complications in people with diabetes found to have depression.

METHOD

Four Primary care health centers were randomly selected for the study. People with diabetes aged 20 years and older attending the diabetes clinics in the selected health centers were invited to participate. The sample size was calculated using the Epi Info software version 3.4.3.

The Beck Depression Inventory (BDI) scale was used to screen for depression. The scale is a self-administered one. It consists of 21 groups of questions. Each group consists of four choices (from 0-3). The total score is calculated by summation of all the patient's responses. This scale has been chosen because it is easy to administer, takes 5 to 10 minutes to complete, validated in several studies and found to be a reliable screening tool for depression in people with diabetes[37]. A BDI score of 16 or more is recommended to identify a potential case of depression[37-39]. However, in the presence of plentiful resources, Lustman et al recommend a score of 12[39].

The records of 264 screened patients were reviewed to collect the following data: Socio-demographic characteristics including: age, sex, marital status, level of education, smoking, Body Mass Index (BMI), duration of diabetes, control of diabetes (measuring glycated hemoglobin, HbA1c), use of insulin, presence of diabetes complications, such as retinopathy (as reported in the retinal screening referral form), nephropathy, defined as glomerular filtration rate < 60ml/min/1.73 m^2 body surface area, erectile dysfunction, neuropathy

(monofilament test), ischemic heart disease (IHD), stroke, and peripheral vascular disease (absence of peripheral pulse), presence of co-morbid conditions, hypertension and hyperlipidemia and the use of antidepressant(s)[40]. The Primary National Research Committee approved the study.

RESULT

Two hundred and sixty-four completed questionnaires were analyzed. The majority of the patients (99.25%) were having type 2 diabetes. Females constituted 60.6% of the study sample. The prevalence of depression among the study participants according to BDI scale was 33.3% with a mean score of 13.11 ± 9.637. The relationship between demographic and social characteristics of the patients surveyed and BDI score is shown in Table 1 and 2.

Table 1: Personal Characteristics of the Population Surveyed

Demographic characteristics	**BDI score ≥ 16 (%) N 88**	**BDI score < 16 (%) N 176**	**Total (%) N 264**
Age (years)			
<40	9 (10.2)	10 (5.7)	19 (7.2)
40-49	29 (33)	49 (27.8)	78 (29.6)
50-59	36 (40.9)	71 (40.3)	107 (40.5)
60-69	10 (11.4)	31 (17.7)	41 (15.5
≥70	4 (4.5)	15 (8.5)	19 (7.2)
Total	88 (100)	176 (100)	264 (100)
p value 0.417			
Sex			
M	24 (27.3)	80 (45.5)	104 (39.4)
F	64 (72.7)	96 (54.5)	160 (60.6)
Total	88 (100)	176 (100)	264 (100)
p value 0.004			
Marital status			
Married	83 (94.3)	165 (93.8)	248 (93.9)
Single	3 (3.4)	6 (3.4)	9 (3.4)
Widowed	2 (2.3)	3 (1.7)	5 (1.9)
Divorced	0	2 (1.1)	2 (0.8)
Total	88 (100)	176	264 (100)
p value 0.776			

Table 2: Relationship between Social Factors and BDI Score

Social factor	BDI score ≥ 16 (%) N 88	BDI score < 16 (%) N 176	Total (%) N 264
Educational level			
Illiterate	11 (12.5)	28 (16)	39 (14.8)
Primary	16 (18.2)	27 (15.3)	43 (16.2)
Intermediate	13 (14.8)	14 (8)	27 (10.2)
Secondary	21 (23.8)	59 (33.5)	80 (30.3)
Higher education	10 (11.4)	30 (17)	40 (15.2)
No data	17 (19.3)	18 (10.2)	35 (13.3)
Total	88 (100)	176 (100)	264 (100)
p value 0.189			
Smoking			
Yes	8 (9.1)	23 (13)	31 (11.8)
No	68 (77.3)	133 (75.6)	201 (76.1)
No data	12 (13.6)	20 (11.4)	32 (12.1)
Total	88 (100)	176 (100)	264 (100)
p value 0.376			
BMI (kg/m^2)			
<18	0	1 (0.6)	1 (0.3)
18.5-24.9	8 (9.2)	23 (13)	31 (11.8)
25-29.9	15 (17)	61 (34.7)	76 (28.8)
≥30	50 (56.8)	70 (39.8)	120 (45.5)
No data	15 (17)	21 (11.9)	36 (13.6)
Total	88 (100)	176 (100)	264 (100)
p value 0.010			

Table 1 shows that females constituted 72.7% of patients who scored more than, or equal to 16 on BDI scale compared to males who constituted 27.3%; the difference was statistically significant (*p value 0.004*). The relative risk for depression was almost twice among females compared to males [odds ratio (OR) was 1.7 and 95% CI was 1.16-2.58]. However, there was no statistically significant difference regarding age or marital status.

Table 2 shows that obese (BMI ≥ 30 kg/m^2) people with diabetes are much more likely (> 56.8%) to have high score (≥ 16), while overweight (BMI 25-29.9kg/m^2) patients are more likely to have lower score (< 16). The difference was statistically significant. The study did not show any significant statistical difference between educational level, smoking and BDI score.

Forty-one patients, 41/264 (15.5%), were found to have controlled diabetes (HbA1c < 5.3%; normal range: 2.4-4.3%). The Ministry of Health adopted International Federation of Clinical Chemistry Standards; less than 5.3% is equivalent to < 7% by National Glycohemoglobin Standardized Program recommended by American Diabetes Association[41]. There was no statistical significant difference (*p value 0 .810)* between the level of control and BDI score as 31.7% of patients with controlled diabetes were having depressive symptoms compared to 33.6% of the uncontrolled patients.

Thirty-two patients, 32/88, (36.4%), who scored more than, or equal to 16 were using insulin compared to 41/176 (23.3%) patients who scored less than 16 (data not shown). The difference was found to be statistically significant (*p value .038*).

Most of the patients (219/264; 83%) had concomitant dyslipidemia. There was no statistical significant difference (*p value 0.679*) between the presence of dyslipidemia and having higher BDI score because 34.2% of patients with dyslipidemia were found to have BDI ≥ 16 compared to 31% of subjects without dyslipidemia.

More than half of the patients (163/264, 61.8%) had concomitant hypertension and 33% of them scored ≥ 16 points compared to 34.7% of those patients who were not hypertensive; therefore, it was not statistically significant (*p value 0.796*).

The duration of diabetes did not show any statistical significant difference between those who had higher and those who had lower scores. Similarly, apart from nephropathy and IHD, there was no statistical significant difference between BDI score and other diabetic complications as shown in Table 3, 4 and 5.

Table 3: Relationship between Microvascular Complications and BDI Score

Complications	**BDI score ≥ 16 (%) N 88**	**BDI score < 16 (%) N 176**	**Total (%) N 264**
Neuropathy			
Yes	3 (3.4)	1 (0.6)	4 (1.5)
No	77 (87.5)	160 (90.9)	237 (89.8)
No data	8 (9.1)	15 (8.5)	23 (8.7)
Total	88 (100)	176 (100)	264 (100)
p value 0.157			
Retinopathy			
Yes	12 (13.7)	25 (14.2)	37 (14)
No	37 (42)	65 (36.9)	102 (38.6)
No data	39 (44.3)	86 (48.9)	125 (47.4)
Total	88 (100)	176 (100)	264 (100)
p value 0 .675			
Nephropathy			
Yes	4 (4.5)	25 (14.2)	29(10.9)
No	73 (83)	120 (68.2)	193 (73.2)
No data	11 (12.5)	31 (17.6)	42 (15.9)
Total	88 (100)	176 (100)	264(100)
p value 0.011			

Table 4: Relationship between Erectile Dysfunction and BDI Score (Microvascular)

Erectile Dysfunction	BDI score ≥ 16 (%) N 24	BDI score < 16 (%) N 80	Total (%) N 104
Present	11 (45.8)	29 (36.3)	40 (38.5)
Absent	12 (50)	34 (42.5)	46 (44.2)
No data	1 (3.2)	17 (21.2)	18 (17.3)
Total	24 (100)	80 (100)	104 (100)
P value 0.883			

Table 5: Relationship between Macrovascular Complications and BDI Score

Complications	BDI score ≥ 16 (%) N 88	BDI score < 16 (%) N 176	Total (%) N 264
IHD*			
Yes	4 (4.6)	22 (12.5)	26 (9.9)
No	83 (94.3)	152 (86.4)	235 (89)
No data	1 (1.1)	2 (1.1)	3 (1.1)
Total	88 (100)	176 (100)	264 (100)
p value .046:			
Stroke			
Yes	2 (2.3)	2 (1.1)	4 (1.5)
No	86 (97.7)	172 (97.8)	258 (97.7)
No data	0	2 (1.1)	2 (0.8)
Total	88 (100)	176 (100)	264 (100)
p value 0.484:			
PVD**			
Yes	0	3 (1.7)	3 (1.1)
No	81 (92)	164 (93.2)	245 (92.8)
No data	7 (8)	9 (5.1)	16 (6.1)
Total	88 (100)	176 (100)	264 (100)
p value 0.225			

*Ischemic heart disease
**peripheral vascular disease

It was found that only 6 (2.3%) were using antidepressants, 3/88 (3.4%), among patients who scored 16 or more and, 3/176 (1.7%) among those who scored less than 16 as shown in the Figure 1.

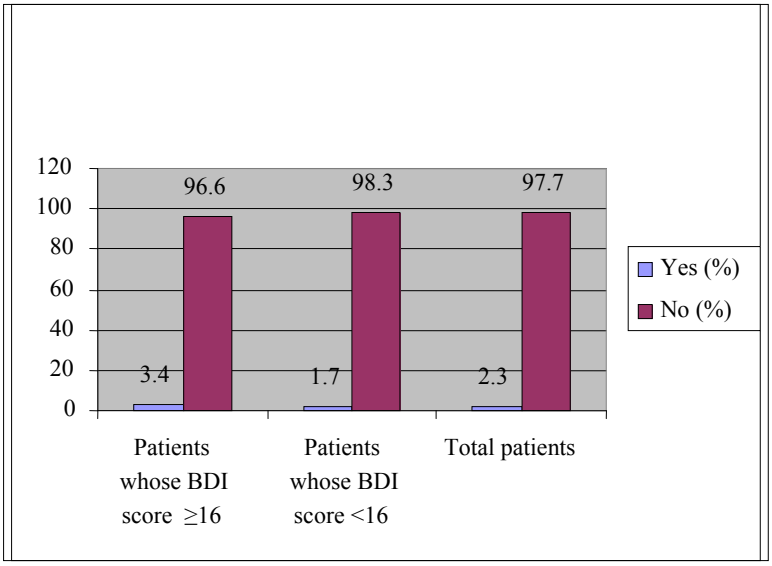

Figure 1: The Use of Antidepressants in the Total Patients Surveyed

DISCUSSION

The study showed that one-third of the screened patients are potential cases of depression. Most of them were females and more than half were obese. There was no association between diabetic control, duration, and most diabetic complications. Only few patients were on treatment for depression.

The relationship between diabetes mellitus and depression had been the subject of many researches and meta-analysis. There was a debate whether diabetes causes depression or not. Many studies even went further to investigate the possibility of depression as a risk factor for developing diabetes. However, the results are inconsistent. While most studies found that depression is highly prevalent among people with diabetes in different cultural settings when compared to non-diabetics; other large studies found that diabetes does not increase the risk or the risk is increased only in the presence of other co-morbidities[10,42-51]. In a recent meta-analysis, type 2 diabetes was found to be associated with only modest increased risk of depression[52]. The prevalence rate in this study is comparable to a recent study, which used a similar scale and in studies that used self reported questionnaires[10,46.]

It may be argued that the high prevalence rate found in this study is due to many patients having uncontrolled diabetes (85%), which is similar to what have been seen in previous studies[53,54]. However, the results of the studies focusing on the relationship between depression and poor glycemic control varied. These studies can be classified into two types: those that compared depressed and non-depressed populations and those that assessed the relationship between depressive symptoms and glycemic control. Both revealed mixed results. Overall, no clear relationship has been demonstrated especially in the latter type in which numerous studies have failed to show an association between HbA1c and depression

scores[46,51,55]. In a meta-analysis, which included 24 clinical studies, the calculated effect size of the relationship between depression and glycemic control was much smaller in studies that use self-report questionnaires compared to studies that used standardized interviews or diagnostic criteria[56].

This study showed that more than 70% of those who scored ≥ 16 points were females. The predominance of depression among females is consistent with other studies. In a meta-analysis, Anderson et al found that diabetes doubles the risk of depression and it is especially more among females 28.2% compared to 18% among males; this finding has been replicated in several recent studies[10,17,45,46,57,58].

About 75% of the total sample was either overweight or obese which is expected in people with type 2 diabetes. However, the BDI score was much higher among obese patients; the difference was statistically significant, see Table 2.

In a large community study, depression was found to be more common among diabetic women especially if they were overweight and the body weight in these women was a predictor of depression more than diabetes itself[59]. Similarly, recent studies have found that higher BMI was a predictor of depression in type 2 diabetes[46,60].

No statistical significant association was found between most diabetic complications as shown in Table 3, 4 and 5. However, the numbers in the tables are too small to power the study to detect statistically significant association.

The association between depression and diabetic complications, both macrovascular and microvascular, has been reviewed by a meta-analysis of 27 studies, which involved both type 1 and type 2 diabetes. The analysis demonstrated a significant and consistent association[12]. Similarly, a large prospective study among elder type 2 patients found an increased risk of complications in the presence of depression. The study also found that depression not only increased the occurrence of complications but also accelerated the onset of microvascular complications[57].

This study showed that there is a statistical significant association between depression and the use of insulin which is similar to a recent survey[61]. This could be explained, at least in part, by delayed insulin initiation[54]. Delayed initiation of insulin in type 2 is common among physicians due to failure to act when drug intensification is needed; this delays the opportunity for improving metabolic control and thereby makes a substantial number of patients vulnerable to diabetic complications and its adverse outcomes, including depression[62].

Two important findings in this study need to be highlighted. First, 85% of those who scored ≥ 16 points are age-working adults shown in Table 1 which is common in developing countries compared to older age groups in developed countries[63]. This may lead to significant impact not only on diabetes care, but also on productivity. Studies have found that depressed people with diabetes can have significant work disability and increased absence of work, twice as common compared to normal population[64,65].

Second, psychosocial assessment seems to be neglected in these patients as only 6/264 (2.3%) are on anti-depressants as shown in Figure 1, 3 were probably on maintenance or in the recovery phase as they scored less than 16 points. One might argue that these patients might

have received other forms of treatment, for example, psychotherapy which was found to be effective in these patients[26]. However, no evidence for that was seen by reviewing the patients' records. Furthermore, this form of therapy need to be conducted by trained health care providers to be effective. Despite the availability of effective treatment, under-recognition and under-treatment of depression remain a problem because it is a consistent finding in numerous studies[4,5,33-35]. World Health Organization estimated that fewer than 25% of depressed people have access to effective treatment[8].

CONCLUSION

Although about one third of the screened patients were potential cases of depression, the great majority were under-recognized and undertreated. Hence, psychosocial assessment should be part of initial and ongoing evaluation of these patients to improve their quality of life and decrease adverse outcomes.

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