ORIGINAL RESEARCH

PREVALENCE OF DEPRESSION IN PATIENTS WITH TYPE II DIABETES MELLITUS AND ITS RELATIONSHIP WITH DURATION OF DIABETES AND MICROVASCULAR COMPLICATIONS

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ABSTRACT

Background: Diabetes mellitus (DM) is a metabolic disorder of multiple etiologies, and is defined by chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism. **Objectives:** to investigate the prevalence of depression in patients with type 2 diabetes and its relationship with duration of diabetes and presence of microvascular complications. **Materials and Methods:** A cross-sectional study was conducted in known diabetes patients in Department of Medicine, at a tertiary care Hospital during a period of 12 months. **Results:** The prevalence of depression among diabetics was 19%, with mild depression seen in 18.1% of cases, while moderate depression was seen in 0.91% of cases. The duration of diabetes was significantly more in diabetic cases with depression as compared to those without depression (p-0.02). The prevalence of depression among diabetic cases with microvascular complications was 26.8%, while it was 13.3% in cases without microvascular complications (p<0.01). Poor glycemic control was seen in over a third of cases (35.9%) with depression as compared to 28.6% among cases without depression (p-0.07).

Conclusion: the present study showed that every fifth diabetic is suffering from depression. The presence of depression was significantly associated with the duration of diabetes, the presence of microvascular complications, and worsening of glycemic control

Keywords: Prevalence, Depression, Type II Diabetes Mellitus, Duration, Microvascular complications

Introduction: The estimated number of diabetic patients worldwide was 171 million in 2000, which is expected to increase to 366 million by 2030, and the percentage of diabetics living in developing countries is projected to increase from 74% in 2000 to 81% in 2030 [1].

The aetiology of diabetes in India is multifactorial and includes genetic factors coupled with environmental influences such as obesity associated with rising living standards, steady urban migration, and lifestyle changes.

Diabetes mellitus is strongly associated with microvascular complications such as nephropathy, retinopathy, and neuropathy, leading to organ and tissue damage, and these complications are seen in approximately one-third to one-half of people with the disease [2].

Depression is a common illness worldwide, with an estimated 350 million people affected. Especially when long-lasting and with moderate or severe intensity, depression may become a serious health condition. It can cause the affected person to suffer greatly and function poorly at work, at school and in the family [3].

One of the greatest challenges of medicine in the 21st century is co-morbidity, where two or more diseases occur together in the same individual [3]. Globally, an estimated 43 million diabetics have symptoms of depression [4]. People with diabetes who have depression often find it more difficult to follow diabetes treatment recommendations and have poor metabolic control. Thus, depression can further aggravate the blood sugar levels, and hence 'a vicious cycle' occurs. These patients also have higher complication rates, increased healthcare use, increased disability, lost productivity, lower quality of life, and an increased risk of death. [5]

Depression is associated with physiological abnormalities, including activation of the hypothalamic–pituitary–adrenal axis, the sympathoadrenal system, and proinflammatory cytokines, which can induce insulin resistance. [6] While depression may contribute to a poor diabetic-related outcome, diabetes and its complications may also contribute to a poor depression outcome.

Diabetes may be diagnosed and treated, but the depression in these patients goes unnoticed. Most of the time, depression is not considered an important factor and is often ignored or left untreated. The available data regarding the prevalence of depression in type 2 diabetes patients in India is limited. In the present study, we thus investigate the prevalence of depression in patients with type 2 diabetes and its relationship with duration of diabetes and presence of microvascular complications

MATERIALS & METHODS: A cross-sectional study was conducted in known diabetes patients in Department of Medicine, at a tertiary care Hospital during a period of 12 months. The study was commenced after approval from the institutional ethical committee.

Sample Size Calculation:

The sample size was calculated using the following formula:

n= (Zα/2) 2 * (SD * 2) / E2

Where;

n- Sample size

Zα/2 – Z value at 5% error (1.96)

P- Prevalence of depression in T2DM (11.6%) [ref.] E – Allowable error (20% of P)

Putting values in the formulae: n - 543

Inclusion Criteria: **1.** Type 2 Diabetes patients of aged 30-60 year, newly diagnosed or follow up cases   presenting to   this Hospital for   their routine diabetes control and willing to provide valid and informed consent to participate.

1. Patients aged 30-60 years and with adequate cognitive functions to perform the interview.

Exclusion Criteria:

1. Those patients of Diabetes Mellitus with severe complications like: End stage renal disease and Limb amputation.
2. Patients on any Psychiatric treatment.

Methodology: A detailed demographic and medical history was taken in all cases followed by a general and systemic examination. This is followed by required investigations as per hospital protocol.

All the cases were then assessed using the Hamilton Depression Rating Scale (HAM-D) for presence of depression. HAM-D is a 17 questionnaire, multiple choice self-reporting inventories. It generally takes 15-20 minutes to complete the interview and score the results. Eight items are scored on a 5-point scale, ranging from 0 = not present to 4 = severe. Nine are scored from 0-2

Statistical Analysis: All the data was noted down in a pre-designed study proforma. Qualitative data was represented in the form of frequency and percentage. Association between qualitative variables was assessed by Fisher's exact test. Quantitative data was represented using Mean ± SD. Analysis of quantitative data between the two groups was done using an unpaired t-test if the data passed 'Normality Test" and by Mann-Whitney Test if data failed 'Normality test'. A p-value < 0.05 was taken as level of significance. Results were graphically represented where deemed necessary. SPSS Version 21.0 was used for most analysis and Microsoft Excel 2010 for graphical representation.

RESULTS: Mean age of the diabetics was 51.64 years with over half (50.1%) of the cases were over 50 years of age. Out of the total 543 cases, 59.1% were males while 40.9% were females. Among the study cohort, 20.4% cases were illiterate while 36.6% were studied only upto primary level. Most of the cases (90.1%) were married while 7.4% were widow or widower and 2.6% were separated. Associated co-morbidities include hypertension (48.3%), CAD (13.8%) and thyroid dysfunction (4.8%).

Mean duration of diabetes was 8.9 years with 46.6% cases being known diabetics for over 10 years. Microvascular complications were seen in 42% diabetic cases. Out of total 543 diabetic cases, poor glycemic control was observed in 30% cases.

The prevalence of depression among diabetics was 19% with mild depression seen in 18.1% cases while moderate depression was seen in 0.91% cases. Table 1

Table 1. Distribution of study groups as per prevalence of depression

HAM- D Rating	N	%
No Depression	440	81.0%
Mild Depression	98	18.1%
Moderate Depression	5	0.9%
Total	543	100.0%

Duration of diabetes was significantly more in diabetic cases with depression as compared to those without depression (p-0.02). Table 2

Table 2. Association of depression among diabetics with duration of diabetes

Variables	Depression	N	Mean	SD	p- value
Duration of Diabetes	No	440	10.41	6.65	0.02
	Yes	103	11.89	6.25	

Prevalence of depression among diabetic cases with microvascular complications was 26.8% while it was 13.3% in cases without microvascular complications (p<0.01). Table 3

Table3. Association of depression among diabetics with presence of microvascular complications

Microvascular complications	Depression		Total
	No	Yes	
No	273	42	315
	86.7%	13.3%	100.0%
Yes	167	61	228
	73.2%	26.8%	100.0%
Total	440	103	543
	81.0%	19.0%	100.0%
p- value <0.01			

Poor glycemic control was seen in over a third of cases (35.9%) with depression as compared to 28.6% among cases without depression (p-0.07). Table 4

Table 4. Association of depression among diabetics with glycemic control

Glycemic Control	Depression		Total
	No	Yes	
Good	324	66	380
	73.6%	64.1%	70.0%
Poor	126	37	163
	28.6%	35.9%	30.0%
Total	440	103	543
	100.0%	100.0%	100.0%
p- value - 0.07			

DISCUSSION

Alhunayni NM et al. [7] conducted a similar study among diabetics. The mean age of the cases was 48.8 ± 7.7 years, with 55.9% of males and 44.1% of females. About 58% were married, 27% were divorced or widowed, and 42% were educated below the secondary level. Khan D et al. [8] in their study recruited 353 participants. Nearly half (44.2%) were between 41 to 60 years of age, with a mean age of 48.6 ± 18.0 years. The majority were males (64.9%). About 73% of cases were married, 20% were single, and 7% were separated/ divorced. Illiteracy was 13% while 49.3% were educated only till primary level. Engidaw N et al. [9] observed the mean age of respondents as 56.4 (SD = 13.3) years. About 52.4% of the participants were males, and a higher percentage (72.7%) of the participants were orthodox in religion. Sixty-two percent of the respondents were married, and 21.3% of the participants

attended secondary school. Alajmani DS et al. [10] in their study observed 65% of cases above the age of 50 years, with 57% of females and 43% of males. 90% were married and 44% were illiterate. Tran NM et al. [3] studied 216 patients with type 2 diabetes mellitus, with a mean age of 64.73 (SD 13.68), 114 women (52.80%) and 102 men (47.20%). Three-fourths fourth of the cases were educated less than secondary level.

The prevalence of depression among diabetics was 19%, with mild depression seen in 18.1% of cases, while moderate depression was seen in 0.91% of cases.

The overall prevalence of depression in people with diabetes was reported to vary from 8.5% to 49% [11-12]. Naseer Ali et al. [13] found the prevalence of depression was 27.0% amongst diabetic subjects and 11.1% amongst healthy controls, in New Delhi. Siddiqui et al. [14] found that there is a higher prevalence of depression in patients with type 2 diabetes, almost twice as high as compared to those without diabetes (35.4% vs 20%; p=0.006). Madhu et al. 43 reported the prevalence of depression to be 49% amongst subjects with diabetes in Trivandrum, India. Ranjan Das et al. [15] showed that in West Bengal, the prevalence of depression was 46.2% and reported that the presence of depression in type 2 diabetes. In other studies, around the world, Studies by de Groot et al. [16] in their review showed that the overall prevalence of depression in diabetes was reported to vary from 8.5% to 27.3%. An Ethopian study demonstrated that depression is a common health problem in type 2 diabetic outpatients with a prevalence rate of 13%. [17] A Trinidad study reported a prevalence of 17.9% among subjects with type 2 diabetes. [18].

Duration of diabetes & depression In general, depressive symptoms elevate immediately following diagnosis and then decrease over several years. In one study, durations of diabetes >30 years were associated with increased odds of depression. The increase in depression with longer durations of diabetes was shown to be mediated by increased frailty scores [19]. Alhunayni NM et al. [7] in their study found that the risk of depression among type 2 diabetic patients increased significantly with the increase in the duration of disease (OR = 5.83, CI: 3.48–9.77, P = 0.0001). Alajmani DS et al. [10] also observed that the duration of diabetes > 10 years had the highest prevalence of depression in the participants (50% vs 22.9%). This may be explained by the increased risk of complications with a longer duration of disease, which in turn increases the risk of depression.

Diabetic complications and depression earlier studies have examined the association of depression with micro and macrovascular complications of diabetes and there is evidence to suggest that the long-term complications of diabetes are associated with depressive symptoms [20]. In the present study, depression was seen in 26.8% of diabetic cases with complications as compared to 13.3% among cases without diabetic complications (p<0.01). The CURES study found the prevalence of depression as significantly higher among diabetic subjects with DR (35.0% vs 21.1%, p<0.001), neuropathy (28.4% vs 15.9%, p = 0.023), nephropathy (35.6% vs 24.5%, p = 0.04) and PVD (48.0% vs 27.4%, p<0.001) as compared to subjects without these complications [21]. Alhunayni NM et al. [7] in their study found that the presence of complications (retinopathy, nephropathy, neuropathy) was also found to be significantly related to the risk of depression. A study conducted by Sachdeva et al. [22], also concluded a higher prevalence of depression in type 2 diabetic patients with retinopathy, neuropathy, and nephropathy compared to those without these complications.

Diabetic control and depression Worsening glycemic control could be an indication that a person is depressed. In the present study, poor glycemic control was seen in over a third of cases (35.9%) with depression as compared to 28.6% among cases without depression (p-0.07). Studies have shown that the presence of depression in patients with diabetes mellitus worsens the prognosis of diabetes, increases noncompliance to the medical treatment, decreases quality of life, prolongs the recovery from diabetes and disrupts glycemic control [7,8,17]. Alajmani DS et al. [10] in their study also observed that the majority of the cases with depression had poor glycemic control (48%). They concluded that diabetic individuals are less likely to comply with diabetes self-care recommendations and are more likely to follow a sedentary lifestyle with a probability of poor diabetes control and clinical outcomes. Anderson RJ et al. [23] in their meta-analysis observed that the prevalence of comorbid depression was significantly higher in the uncontrolled (30%) than in the controlled diabetics (21%). Relief of depression was observed to be associated with improved glycemic control.

CONCLUSION: the present study showed that every fifth diabetic is suffering from depression. The presence of depression was significantly associated with the duration of diabetes, the presence of microvascular complications, and worsening of glycemic control. The present study thus recommends that psychological counselling should be part of diabetic management, especially once the duration increases to over 5 years.

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