Original Research Article

Depression in type 2 diabetes mellitus patients: a cross sectional study from rural tertiary care hospital of South Karnataka, India

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ABSTRACT

Background: Depression is associated with a 60% increased risk of Type 2 Diabetes mellitus and diabetes doubles the odds of depression. This study was undertaken to estimate the prevalence of depression and to assess the association between glycemic control and depression in diabetic patients.

Methods: Total 130 type 2 diabetes mellitus patients were included in this cross-sectional hospital-based study. Study protocol included detailed clinical history, examination, administering of questionnaire-based scale and investigations. Fasting plasma glucose, post prandial plasma glucose, HbA1c, lipid profile, renal function test and electrolytes of these subjects were determined. Becks depression inventory (BDI) scale was used for diagnosis and grading the severity of depression among these patients.

Results: Out of 130 diabetic patients, depression was present in 39.23% of the individuals, among which, 16.15% had mild depression, 10% had borderline depression, 7.69% had moderate depression, 3.07% had severe depression and 2.3% had extreme depression. Prevalence of depression in patients with glycated haemoglobin levels of ≤6.4 was found to be 29.16%, 6.5 to 7 was 33.76% and ≥7.1% was 62.07%.

Conclusions: Depression was found to be more common in diabetic patients compared to general population. The prevalence of depression was more among patients with long duration of diabetes, female sex, Muslim religion, substance abuse, complications associated with diabetes and poor glycaemic control. More case control studies with larger sample size are needed to confirm this association.

Keywords: Becks depression inventory, Depression, Type 2 diabetes mellitus.

INTRODUCTION

Type 2 Diabetes mellitus (T2DM) is the most common endocrine disease. It is a metabolic disorder of multiple aetiologies. It is characterized by chronic hyperglycaemia associated with disturbances of carbohydrate, fat and protein metabolism due to absolute or relative deficiency of insulin secretion or action.[1] Approximately 5.1 million people aged between 20 and 79 years died from diabetes accounting for 8.4% of global all-cause mortality in this age group.[2] In India, 65.1 million in the age group of 20 to 79 have diabetes (8.56%) and expected to rise to 109 million by the year 2035.[3] According to Global Health Estimates 2015, depressive disorders accounted for nearly one third of the total Disability Adjusted Life Years caused by mental and substance use disorder.[4] It is projected to be the second leading cause of disease burden globally and third leading cause of disease burden by 2030.[5] There is a significant association between depression and incidence of T2DM. Depression is

associated with a 60% increased risk of T2DM and diabetes doubles the odds of depression.[6,7] Previous studies have proved the importance of early detection of depression.[6] Although diabetes is very common in south India, studies on depression in T2DM patients from rural sector are lacking. This study was undertaken to estimate the prevalence of depression and to assess the correlation between glycemic control and depression in diabetic patients.

METHODS

After taking ethical committee clearance from the institution, this cross-sectional hospital-based study was conducted among 130 patients attending Adichunchanagiri Hospital and Research Centre for outpatient or inpatient diabetic care. Study period was from August 2018 to March 2019.

Inclusion criteria

- Patients with T2DM.

Exclusion criteria

- Patients with thyroid disorder
- Patients with stroke, dementia, epilepsy
- Patients with type 1 DM
- Patients with known psychiatric disorders other than depression
- Patients with chronic obstructive lung disease.

Study protocol included detailed clinical history, clinical examination and investigations. After taking informed consent from the patient, a detailed clinical work up incorporating details of age, presenting complaints, diet, smoking, alcohol consumption, physical activity, reproductive history, socioeconomic status, body mass index and pedigree chart was made.

Diabetic history including duration of diabetes mellitus and the treatment which they are taking, and complications related to diabetes were noted. Fasting and postprandial blood glucose along with HbA1c levels was done to evaluate for glycemic control.

Serum was tested for fasting serum lipid, renal function tests, and serum electrolytes. Urine was tested for microalbuminuria and proteinuria. Diagnosis of neuropathy was made on the basis of clinical examination for sense of touch, pain, vibration and reflexes. 128 Hz tuning fork was used to examine vibration sense and 10 g monofilament was used to evaluate light touch perception. Fundus examination was done by Ophthalmologist for retinopathy.

Becks depression inventory (BDI) scale was used for diagnosis and grading the severity of depression among the patients.

Definition of terms

Patients on oral hypoglycemic drugs, Insulin or those having fasting blood sugar >126 g/dl were regarded as having diabetes mellitus. Those with blood pressure >140/90 mmHg taken twice or those on antihypertensive drugs were defined as hypertensive. A diagnosis of hyperlipidemia was made if total Cholesterol is >160 mg/dl, Triglycerides >150 mg/dl, and LDL >130 mg/dl.

Height, waist and hip circumference were measured in centimeters by using a non-stretchable standard tape with a metal buckle at one end over the light clothing. Waist circumference was measured in the centre of the iliac crest and the coastal margin, and hip circumference was measured at the widest point on buttocks below the iliac crest. Patients were divided in to non-obese and obese on the basis of body mass index (BMI). A BMI of 27.3 Kg/m2 or more in female indicates obesity.

$$BMI = Body\ weight\ (Kg)/Height2\ (meters)$$

Menopause was considered to be present when there was no history of menstrual periods for the last one year. Current smokers were defined as those who smoked any form of tobacco in the previous 6 months while former smoker was those who had quit more than 6 months earlier.

Subjects were asked about duration of tobacco intake and amounts consumed and were divided in two groups, tobacco chewer and non-tobacco chewer. 24 hour urinary albumin value of >300 mg/dl was taken as confirmed diabetic nephropathy. Neuropathy was defined as diminished or lack of perception of touch or pain stimuli and loss of joint position sense, pressure and vibration sense.

Study tool

Kannada version of the BDI scale questionnaire was used in this study. The face and content validity of the questionnaire in local language was done by experts in the field. The T2DM patients were administered the BDI in the local language by investigators. The BDI has 21 multiple-choice questionnaires.

Responses to the 21 questionnaires are made on a 4-point scale, ranging from 0 to 3. Total scores range from 0 to 63. Scores 11-16, 17-20, 21-30, 31-40, and over 40 represent cut points for mild mood disturbance, borderline clinical depression, moderate depression, severe depression, and extreme depression, respectively.

Data analysis

Data were compiled and tabulated by using standard appropriate statistical technique, which includes numbers and percentages.

RESULTS

Among 130 Diabetic patients (n=130) included in this study, 54 were male (41.5%) and 76 were female (58.46%) (Table 1). Majority of the patients were belonging to age group 41-50 years (30.76%) and 51-60 years (35.38%) (Figure 1, Table 2). In this, 88 patients (67.7%) were Hindus, 22 were Muslims (16.9%) and 20 patients (15.3%) belonging to other religions. Among 130 patients, 28 were alcoholic (21.5%), in which majority were male (17.69%) and 25 (19.2%) were tobacco chewers (7.69%)/smokers (11.5%).

Table 1: Sex wise distribution of Diabetic patients with depression.

Sex	No. of patients (%)	Depression (%)
Male	54 (41.5%)	15 (27.78%)
Female	76 (58.46%)	36 (47.37%)
Total	130 (100%)	51 (39.23%)
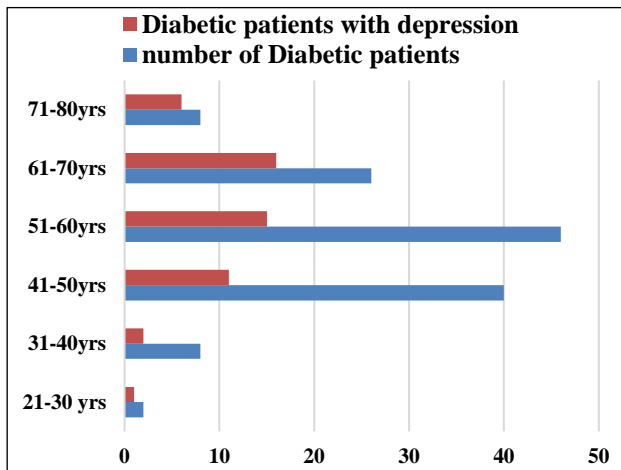
Figure 1: Age wise distribution of diabetic patients with depression.

Table 2: Age wise distribution of diabetic patients with depression.

Age (in yrs)	Number of diabetic patients (%)	Diabetic patients with depression (%)
21-30	2 (1.53%)	1 (50.00%)
31-40	8 (6.15%)	2 (25.00%)
41-50	40 (30.76%)	11 (27.50%)
51-60	46 (35.38%)	15 (32.60%)
61-70	26 (20.00%)	16 (61.53%)
71-80	8 (6.15%)	6 (75.00%)
Total	130 (100%)	51 (39.23%)

In 130 Diabetic patients 51 were having depression (39.23%) in which 21 patients were having mild depression (16.15%), 13 were having borderline depression (10%), 10 were having moderate depression (7.69%), 4 were severe (3.07%) and 3 were having extreme depression (2.3%).

Table 3: Religion wise distribution of Diabetic patients with Depression.

Religion	Number of Diabetic patients (%)	Diabetic patients with depression (%)
Hindu	88 (67.69%)	35 (39.78%)
Muslim	22 (16.92%)	10 (45.45%)
Christian/others	20 (15.38%)	6 (30.00%)
		51 (39.23%)

Among 51 diabetic patients with depression (39.23%) (Figurer 1, Table 2), 1 was in the age group 21-30 years (50.00%), 2 were in the age group of 31-40 years (25.00%), 11 were in the age group 41-50 years (27.50%), 15 were in the age group of 51-60 years (36.20%), 16 were in the age group of 61-70 years (61.53%), 6 were in the age group of 71-80 years (75.00%). Among 54 male patients 15 had depression (27.78%) and in 76 female patients 36 had depression (47.37%) (Table 1).

In 88 Hindu patients 35 had depression (39.78%), in 22 Muslims 10 patients had depression (4Fig5.45%) and 20 patients of other religions 6 had depression (30. 00%) (Table 3). Among 130 patients 28 were alcoholic (21.56%) in which 15 had depression in which 15 had depression (53.57%) and 25 were smokers (19.23%) in which 16 had depression (64.00%) (Table 4).

Out of 130 diabetic patients 22 had diabetic retinopathy (16.92%) in which 15 had depression (68.18%), 33 patients had diabetic nephropathy (25.38%) in which 13 had depression (39.39%), 37 patients had peripheral neuropathy (28.46%) in which 19 had depression (51.35%) and 4 patients had macro vascular complications among which 3 had depression (75%) (Table 5).Prevalence of depression in patients with glycated haemoglobin levels of ≤6.4 was found to be 29.16%, 6.5 to 7 was 33.76% and ≥7.1% was 62.07%(Table 6).

The ASC was more in males bilaterally than in females. The difference was statistically significant on right side (P = 0.00). The ASS was more in females than in males on right and vice versa on the left side. The difference was not statistically significant. The ATS was more in the males bilaterally than in females. The difference was not statistically significant. The thickness of the asterion was more in females on right and the same was more on left in males. The difference was not statistically significant (Table 3).

Table 4: Substance abuse in Diabetic patients with depression.

	Number of patients	Sex	Patients with depression
Alcohol consumption			
Alcoholic	28(21.54%)	23- male	12 (52.17%)
		05- female	03 (60.00%)
Non-alcoholic	102(78.46%)		36
Smoking/tobacco chewing			
Smoker	25(19.23%)	15- male	09 (60.00%)
		10-female	07 (70.00%)
Non- smoker	105(80.76%)		

Table 5: Complications in Diabetic patients with Depression.

Complications	Number of diabetic patients	Patients with depression
Diabetic retinopathy	22 (16.92%)	15 (68.18%)
Diabetic nephropathy	33 (25.38%)	13 (39.39%)
Diabetic peripheral neuropathy	37 (28.46%)	19 (51.35%)
Diabetic foot/peripheral arterial disease	04 (3.07%)	03 (75.00%)

Table 6: Correlation of glycemic control (glycated haemoglobin) in patients with depression.

HbA1C levels (in percentage %)	Number of diabetic patients	Patients with depression
≤6.4	24 (18.46%)	7 (29.16%)
6.5-7	77 (59.23%)	26 (33.76%)
≥7.1	29 (22.30%)	18 (62.07%)

DISCUSSION

Non communicable diseases are becoming global economic burden in this present era and also affect the mental health of a person due to its chronicity and long duration of treatment. Unhealthy habits like excessive food intake, alcohol consumption, smoking, and sedentary life are more common in patients with depression. These factors increase risk of diabetes mellitus. Due to increased pro-inflammatory cytokines in depressive patients, it leads to insulin resistance. Presence of central obesity and impaired glucose tolerance among depressive patients leads to diabetes. Serum cortisol level is high in depressive individuals due to activation of hypothalamic- pituitary- adrenal axis. Risk factors for diabetes mellitus like dyslipidemia, hypertension, and visceral adiposity will develop due to constant elevated serum cortisol. Depression may occur in diabetics after getting news of this chronic debilitating disease and lifestyle modifications they have to adapt to prevent chronic complications of diabetes. Previous studies shown that relationship between depression and diabetes is bidirectional6.This study is done to assess the prevalence of depression in diabetic patients and to assess its association with complications of diabetes.

In this study, the prevalence of depression among diabetic patients was found to be 39.23%. In UK and USA, the prevalence of depression among diabetic patients were found to be between 30 to 83%.[8,9] Two meta-analyses reported an overall prevalence of depression ranging from 17.6% to 27%.[10] The results in this study were also comparable to Anantha EVM et al where prevalence of depression was 39.70%.[11] A study done by Thour et al in Chandigarh, found the prevalence to be 41%[12] and a study done in a tertiary care hospital in Southern India by Madhu et al found the prevalence to be 49%.[13] In this study, prevalence of depression was more among female diabetic patients (47.37%) compared to male diabetic patients which is similar to studies conducted Anantha EVM et al.[11] Depression was found to be more common in 71-80 years age (75.00%) followed by 61-70 years and 21-30 years age group. In this study, Muslim diabetic patients had more prevalence of depression (45.45%) compared to Hindus and other religion. Patients with substance abuse and diabetes had more prevalence of depression compared to diabetic patients without any substance abuse. Diabetes with associated complications had more prevalence of depression compared to diabetic patients without any complications. Among which patients with macro vascular complications like diabetic foot and peripheral arterial disease had more prevalence of depression (75.00%). Prevalence of depression was also found to be more with poor glycemic control compared to patients with good glycemic control. The above results are comparable to study conducted by Anantha EVM et al, and Salinero-Fort MA, et al.[11,14] The limitation of study is

that it was conducted in small group of population and in a single tertiary health centre.

CONCLUSION

Depression was found to be more common in diabetic patients compared to general population. The prevalence of depression was more among patients with long duration of diabetes, female sex, Muslim religion, substance abuse, complications associated with diabetes and poor glycemic control. So, more awareness programmes are needed regarding mental health in diabetic patients at community level to decrease the prevalence of depression through health education and community participation. Need for good glycemic control has to be stressed. All diabetic patients should receive proper psychiatric counselling for glycemic control and prevention of depression. The main limitation of our study is small sample size. More population-based studies with large sample size needed in future; various geographical areas and populations should be considered.

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Cite this article as: Bettegowda S, Kalegowda M, Mallam S, Ramalingaiah VH. Depression in type 2 diabetes mellitus patients: a cross sectional study from rural tertiary care hospital of South Karnataka, India. Int J Res Med Sci 2019;7:2599-603.