

## Original Research Article

**Prevalence of depression amongst diabetics: A tertiary care hospital study**Akhilesh Kumar<sup>1</sup>, Suman Kumar<sup>2</sup>, Tushar<sup>3</sup>, Laxman Kumar<sup>4</sup>, Vikash Kumar<sup>5</sup><sup>1</sup>Tutor, Department of Community Medicine, Vardhman Institute of Medical Sciences, Pawapuri, Bihar, India<sup>2</sup>Associate Professor & HOD, Department of Community Medicine, Vardhman Institute of Medical Sciences, Pawapuri, Bihar, India<sup>3</sup>Tutor, Department of Community Medicine, Government Medical College, Bettiah, Bihar, India<sup>4</sup>Assistant Professor, Department of Community Medicine, Vardhman Institute of Medical Sciences, Pawapuri, Bihar, India<sup>5</sup>Assistant Professor, Department of Community Medicine, Vardhman Institute of Medical Sciences, Pawapuri, Bihar, India

Received: 02-01-2021 / Revised: 29-01-2021 / Accepted: 11-02-2021

**Abstract**

**Background:** Depression can be viewed as a modifiable independent risk factor for the development of T2DM and for progression of complications from either type 1 or type 2 diabetes. The recognition and addressal of this association can have profound implications for prevention and treatment of these disorders. **Aim:** To study the prevalence of depression among patients with diabetes mellitus type 2. **Methods:** A semi-structured questionnaire was used to collect the sociodemographic profile and the details of the diabetes and its treatment and history of other chronic diseases. Beck depression inventory (BDS-II) was used for evaluation of depression and 8 item Morisky medication adherence scale (MMAS-8) was used for measurement of patient's adherence to medication. **Results:** Majority of the potential cases of depression (33%) were in the age group of 51-60 years. 62% of the patients were male. Majority of the patients (40%) were in the age group of 51-60 years. 73.4% of the married patients were potential cases of depression. 78% of the patients were having family history of type 2 diabetes mellitus. Majority of the patients (72%) were overweight or obese (BMI > 25kg/m<sup>2</sup>). **Conclusion:** Duration of diabetes and duration of treatment was 5-10 years in majority of the patients and were significantly associated with prevalence of depression. Prevalence of depression was associated with sex, religion, and family history but was not statistically significant.

**Keywords:** Beck depression inventory, Depression, Prevalence, Type 2 diabetes mellitus.

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**Introduction**

Diabetes mellitus is a chronic metabolic disease, characterized by a disorder in the metabolism of carbohydrates, lipids, and amino acids, either as a result of decreased insulin secretion or due to a reduction to insulin sensitivity of the cells of the body cells. It is a disease that acquires epidemic form and constitutes one of the major threats to human health in the 21st century[1]. The prevalence of Type 2 diabetes mellitus has been estimated to vary from 8 to 15% among the urban population in India, with a significantly increasing trend over the years[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. Depression is a common problem among those suffering from diabetes mellitus. Depression and severe psychological distress are frequently comorbid with diabetes and are associated with reduced adherence to medication and healthy lifestyle regimens, poorer glycemic control, and increased complications[3-5]. Type 2 diabetes mellitus (T2DM) and depression are major public health issues. Worldwide, more than 365 million people are estimated to have

T2DM, and almost 300 million people have major depression. Both these disorders are projected to be among the five leading causes of disease burden by 2030[6]. Depression can be viewed as a modifiable independent risk factor for the development of T2DM and for progression of complications from either type 1 or type 2 diabetes.<sup>7</sup> The recognition and addressal of this association can have profound implications for prevention and treatment of these disorders.<sup>6</sup> Eighty percent of people with T2DM reside in low- and middle-income countries (LMICs). Yet much of the research around depression among people with diabetes has been conducted in high-income countries (HICs). Depression is common among diabetes, and is associated with poor outcomes. However, the data on this important relationship are limited from India. Studies on prevalence of depression among patients with diabetes has special relevance for India a middle-income country, having high prevalence of both these disorders[8-10]. Research has established the relation between diabetes and depression. There is ample evidence that diabetes and depression are associated. According to a large meta- analysis incorporating data from 42 studies concluded that the prevalence of depression is doubled in individuals with type 2 diabetes compared with those without diabetes[11]. However, the temporal or causal relationship between depression and type-2 diabetes remains unclear. Depression is often regarded as a comorbid condition that results from the daily burden of having diabetes and/or its complications. Interestingly, there are also indications that depression in turn is an independent risk factor for the development of type-2 diabetes[12].

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In addition to the morbidity associated with the disease itself, the presence of depression complicates outcomes in the management of diabetes mellitus. Patients with comorbid depression are more likely to have poor control of hyperglycemia in both type 1 and 2 diabetes mellitus[13]. Depression is also associated with poor adherence to diabetic medications and dietary regimes. There is also lesser physical activity, reduced quality of life, and increased health care expenditure in patients with diabetes and depression[14-16]. The increased prevalence of depressive symptoms among patients with diagnosed DM2 suggests that depressive symptoms might be a consequence of the burden of diabetes. The number of chronic diseases seems to explain part of the association between DM2 and depressive symptoms. More research is needed to confirm the association between Type 2 diabetes and depressive symptoms. Instead of cross-sectional studies, longitudinal studies should be performed to investigate if diabetes is an independent risk factor for the onset of depressive symptoms. In these studies, the influence of a history of depression and the influence of comorbid chronic diseases should be taken into account[17]. Therefore, this research was conducted with the objective of studying the prevalence of depression among patients with diabetes mellitus type 2.

#### Methods

This prospective study was conducted department of Community Medicine (PSM) at Vardhman Institute of Medical Sciences, Pawapuri. The study was approved by the institutional ethical and research committee. The study was conducted for a period of one year from November 2019 to October 2020. An informed and written consent was taken from all the participating subjects prior to the commencement of the study.

Subjects were selected from those attending the outpatient department, emergency and wards of medicine department. The patients of both gender and of all ages with type-2 diabetes mellitus were included in the study. The patients with physical and/or mental conditions that interfere with participation and inability to obtain venous blood sample were excluded. A semi-structured questionnaire was used to collect the sociodemographic profile and the details of the diabetes and its treatment and history of other chronic diseases. The details regarding diabetes were included the duration of the condition, duration of treatment, type of treatment being received, complication due to diabetes, family history of diabetes and Body Mass Index (BMI). The level of diabetes control was assessed by using the HbA<sub>1c</sub> levels, fasting blood glucose and postprandial blood glucose. Beck depression inventory (BDS-II)[18] was used for evaluation of depression and 8 item Morisky medication adherence scale (MMAS-8)[19] was used for measurement of patient's adherence to medication. Subjects were evaluated on the following lines – history, clinical examination and investigations. Details of clinical history, physical examination (general physical examination and systematic examination) and laboratory investigations was recorded as per proforma.

#### Results

Majority of the patients in our study were >40 years (n=85; 85%). Out of this maximum patients were in the age group of 51-60 years (n=40; 40%). Eldest and youngest patient observed in our study were 70 years old and 25 years old respectively. Out of 100 patients observed in this study, 62 (62%) are male and 38 (38%) were female (Table 1).

**Table 1: Distribution of cases according to socio- demographic variables**

Socio-demographic variables	Frequency, n	Percentage
Age groups (years)		
≤30	5	5.0
31-40	10	10.0
41-50	27	27.0
51-60	40	40.0
>60	18	18.0
Sex		
Male	62	62.0
Female	38	38.0
Marital status		
Married	78	78.0
Unmarried	4	4.0
Divorced	5	5.0
Widow	13	13.0
Religion		
Hindu	53	53.0
Muslim	30	30.0
Sikh	12	12.0
Others	5	5.0

Majority of the patients (n=78; 78%) in our study were having family history of type-2 diabetes. Most of the patients (n=72; 72%) were observed to be overweight having BMI >25. Fasting blood sugar was observed to be >125 mg/dl in majority of the patients (70; 70%).

Duration of diabetes and treatment was 5-10 years in majority of the patients (n=52; 52%) and (n=55; 55%) respectively. Majority of the patients (n=60; 60%) were on oral medication (Table 2).

**Table 2: Distribution of cases according to Disease related variables.**

Disease related variables	Frequency, n	Percentage
Family history of diabetes		
Yes	78	78.0
No	22	22.0
Body Mass Index (kg/m <sup>2</sup> )		
≤25	28	28.0
25-30	50	50.0

>30	22	22.0
Fasting Blood Sugar (mg/dl)		
≤110	12	12.0
110-125	18	18.0
>125	70	70.0
HbA <sub>1c</sub> (%)		
<7	37	37.0
≥7	63	63.0
Duration of diabetes (years)		
>5	38	38.0
5-10	52	52.0
>10	10	10.0
Duration of treatment (years)		
>5	42	42.0
5-10	55	55.0
>10	3	3.0
Medication		
Oral	60	60.00
Injection	28	28.0
Oral + Injection	12	12.0

Distribution of cases according to Beck’s Depression Inventory was described in Table 3.

**Table 3: Distribution of cases according to Beck’s Depression Inventory.**

Beck’s depression inventory	Score	Frequency, n (100)	Percentage
Minimal	1-10	23	23
Mild	11-16	10	10.00
Borderline	17-20	20	20
Moderate	21-30	40	40
Severe	≥31	7	7

Majority of the potential cases of depression (n=33; 33%) were in the age group 51-60 years. Out of 62 males 42 were potential cases of depression whereas out of 38 females 25 were potential cases of depression. Majority of the married patients (58 out of 79) were

potential cases of depression. Majority of patients belonging to Hindu community (36 out of 53) were found to be potential cases of depression (Table 4).

**Table 4: Association between socio-demographic variables and depression**

Variables		Number of patients (%)					p-value
		Minimal Depression	Mild Depression	Borderline Depression	Moderate Depression	Severe Depression	
<b>Age (years)</b>	<b>N</b>						
≤30	5	2 (40.00)	0 (0.00)	2 (40.00)	1 (20.00)	0 (0.00)	<0.001
31-40	10	3 (33.33)	1 (10.00)	1 (10.00)	3 (33.34)	2 (20.00)	<0.001
41-50	27	9 (33.34)	4 (14.82)	4 (14.82)	8 (29.63)	2 (7.41)	<0.001
51-60	41	5 (12.20)	3 (7.32)	11 (26.83)	20 (48.78)	2 (4.88)	<0.001
>60	17	4 (23.53)	2 (11.77)	2 (11.77)	8 (47.06)	1 (5.89)	<0.001
<b>Sex</b>							
Male	62	14 (22.58)	6 (9.68)	11 (17.75)	27 (43.55)	4 (6.46)	0.701
Female	38	9 (23.69)	4 (10.53)	9 (23.69)	13 (34.21)	3 (7.90)	
<b>Marital status</b>							
Married	79	14 (17.73)	7 (8.86)	17 (21.52)	35 (44.31)	6 (7.60)	<0.001
Unmarried	3	2 (66.67)	0 (0.00)	0 (0.00)	1 (33.33)	0 (0.00)	<0.001
Divorced	5	1 (20.00)	2 (40.00)	0 (0.00)	2 (40.00)	0 (0.00)	<0.001
Widow	13	6 (46.16)	1 (7.70)	3 (23.08)	2 (15.39)	1 (7.70)	<0.001
<b>Religion</b>							
Hindu	53	12 (22.65)	5 (9.44)	10 (18.87)	23 (43.40)	3 (5.66)	<0.001
Muslim	30	9 (30.00)	2 (6.67)	4 (13.34)	11 (36.67)	4 (13.34)	<0.001
Sikh	12	1 (8.34)	1 (8.34)	6 (50.00)	4 (33.34)	0 (0.00)	<0.001
Others	5	1 (20.00)	2 (40.00)	0 (0.00)	2 (40.00)	0 (0.00)	<0.001

According to table 5, 55 out of 80 (68%) patients having family history of diabetes type 2 and 12 out of 20 (60%) patients having no family history were observed to be potential cases of depression. 22 out of 29 (75.8%) patients having BMI ≤25; 34 out of 50 (68%)

patients having BMI in the range 25-30; and 11 out of 21(52.3%) patients having BMI ≥30 were observed to be potential cases of depression. All of 9 out of 12 (75%) patients having fasting blood sugar (FBS) ≤110; 12 out of 18 (66.6%) patients having fasting blood

sugar (FBS) in the range 110-125; 46 out of 70 (65.7%) patients having fasting blood sugar (FBS)  $\geq 125$  were observed to be potential cases of depression. 17 out of 38 (44.7%) patients having duration of diabetes less than 5 years; 41 out of 52 (78.8%) patients

having duration of diabetes in the range 5-10 years; and 9 out of 10 (90%) patients having duration of diabetes more than 10 years were observed potential cases of depression.

**Table 5: Association between diseases related variables and Depression**

Variables		Number of patients (%)					p-value
		Minimal Depression	Mild Depression	Borderline Depression	Moderate Depression	Severe Depression	
<b>Family history</b>	<b>N</b>						
Yes	80	19 (23.75)	6 (7.50)	16 (20.00)	33 (41.25)	6 (7.50)	<0.001
No	20	4 (20.00)	4 (20.00)	4 (20.00)	7 (35.00)	1 (5.00)	<0.001
<b>BMI (kg/m<sup>2</sup>)</b>							
$\leq 25$	29	4 (13.79)	3 (10.34)	8 (27.59)	14 (48.28)	0 (0.00)	<0.001
25-30	50	12 (24.00)	4 (8.00)	9 (18.00)	19 (38.00)	6 (12.00)	<0.001
>30	21	7 (33.34)	3 (9.09)	3 (9.09)	7 (33.34)	1 (3.04)	<0.001
<b>FBS (mg/dl)</b>							
$\leq 110$	12	3 (25.00)	0 (0.00)	0 (0.00)	8 (66.67)	1 (8.34)	<0.001
110-125	18	5 (27.78)	1 (5.56)	3 (16.65)	7 (38.89)	2 (11.12)	<0.001
>125	70	15 (21.41)	9 (12.86)	17 (24.29)	25 (35.72)	4 (5.72)	<0.001
<b>HbA1c (%)</b>							
<7	38	10 (26.32)	4 (10.53)	6 (5.77)	16 (42.11)	2 (5.27)	
$\geq 7$	62	13 (20.97)	6 (9.68)	14 (22.58)	24 (38.71)	5 (8.06)	0.032
<b>DoD (years)</b>							
>5	38	15 (39.48)	6 (15.78)	7 (18.42)	7 (18.42)	3 (7.90)	<0.001
5-10	52	7 (13.47)	4 (7.70)	12 (23.08)	28 (53.82)	1 (1.93)	<0.001
>10	10	1 (10.00)	0 (0.00)	1 (10.00)	5 (50.00)	3 (30.00)	<0.001
<b>DoT (years)</b>							
>5	42	17 (40.48)	6 (14.29)	8 (19.04)	8 (19.04)	3 (7.14)	<0.001
5-10	54	5 (9.24)	4 (7.41)	12 (22.23)	31 (57.41)	2 (3.71)	<0.001
>10	4	1 (25.00)	0 (0.00)	0 (0.00)	1 (25.00)	2 (50.00)	<0.001
<b>Medication</b>							
Oral	60	16 (26.67)	8 (13.33)	11 (18.33)	22 (36.67)	3 (5.00)	<0.001
Injection	28	5 (17.86)	1 (3.57)	8 (29.57)	13 (46.43)	1 (3.57)	<0.001
Oral + Injection	12	2 (16.67)	1 (8.33)	1 (8.33)	5 (41.67)	3 (25.00)	<0.001

In this study 19 out of 42 (45.2%) patients having duration of treatment less than 5 years; 45 out of 54 (83.3%) patients having duration of treatment in the range 5-10 years; 3 out of 4 (75%) patients having duration of treatment more than 10 years were observed to be potential cases of depression. In our study 36 out of 60 (60%) patients undergoing oral treatment; 22 out of 28 (78.57%) patients undergoing injectables treatment; and 9 out of 12 (75%) patients undergoing combination of oral and injectables treatment were observed to be potential cases of depression. Based on the Pearson's correlation between depression and demographic parameters it is observed that only age and marital status are found to be significantly associated with high BDI-II scores.

#### Discussion

Type 2 diabetes and depression are among major public health issues. Worldwide, more than 365 million people are estimated to have type 2 diabetes mellitus and almost 300 million people have major depression[20]. Both these disorders are projected to be among the five leading causes of burden by 2030. Moreover, India has the largest number of diabetic populations in the world[21].

Depression can be viewed as a modifiable independent risk factor for the development of type 2 diabetes mellitus and for progression of complication from type 2 diabetes. Both diabetes and depression are associated with premature morbidity and mortality, and when these conditions co-exist the risk of developing co-morbidities, complications, patient suffering and associate cost escalates[22,23]. Few studies have been conducted in India to study the prevalence of depression among type 2 diabetes in the past. However, limited data is available as far as Northern India is concerned and rarely such

study has been carried out for Jammu region thereby absence of any existence of such data. In our study a total of one hundred patients were surveyed for the presence of depression symptoms using Beck Depression Inventory (BDI-II) scale. Patient's records were reviewed to obtain data pertaining to age, sex, marital status, Body Mass Index, level of education, smoking status, duration of diabetes mellitus, glycemic control using HbA1c test, use of insulin and presence of additional illness. The demographic pattern in our study is consistent with the available relevant literature. Majority of the patients in our study were males (62%) and rest (38%) were females. Out of 169 cases 73 were males and 69 were females. 3 In our study majority of the patients were above 50 years of age, of which maximum number of patients were in the age group of 51-60 years. Study included 40 patients with age  $\geq 50$  years and 33 patients with age <50 years. 9 Investigated 294 patients out of which majority of patients were  $\leq 65$  years (n=216; 73.5%). 24 All consecutive patients with mean age of 54.2 years in their study[25]. Our study revealed that out of all the surveyed patients 70 patients (70%) scored  $\geq 16$  on BDI-II scale which were potential cases of depression. Depression was observed to be very common among patients in our study based on BDI-II scores. In our study HbA1c, duration of disease and duration of treatment were observed to be significantly associated with high BDI-II scores. Obesity (BMI >30 kg/m<sup>2</sup>) was also observed to be significantly associated with high BDI-II scores. Depression has high prevalence among diabetic patients. They reported 76.9% patients to be depressed in a study conducted in Shahid Rahimi Hospital of Khorramabad, Iran[3]. Prevalence of depression among diabetic patients in other studies has been observed to be less than

observed noticeably more in our study. According to 23% of the studied patients met the criteria of major depression and 18% for moderate depression and 59% had no clinically significant depression[25]. Their study examined the association of diabetes and the onset of depression by reviewing the literature and conducting a meta-analysis of longitudinal studies on this topic and found that people with type 2 diabetes have a 24% increased risk of developing depression[26]. AIIMS, New Delhi studied 77 patients with type 2 diabetes visiting Endocrinology out-patient department and found that depressive episode was found in 16.9% cases. India interviewed 80 patients and found that 38.8% had depressive symptoms[27,28]. In a study conducted in Palestine they reported that 40% of the screened type 2 diabetes patients were potential cases of depression. 24 India found that depression is common among diabetic patients and reported 41% of the studied patients to be depressed[25].

#### Conclusion

Majority of the potential cases of depression (33%) were in the age group of 51-60 years. 62% of the patients were male. Majority of the patients (40%) were in the age group of 51-60 years. 73.4% of the married patients were potential cases of depression. 78% of the patients were having family history of type 2 diabetes mellitus. Majority of the patients (72%) were overweight or obese (BMI > 25kg/m<sup>2</sup>). Duration of diabetes and duration of treatment was 5-10 years in majority of the patients and were significantly associated with prevalence of depression. Prevalence of depression was associated with sex, religion, and family history but was not statistically significant. Authors would suggest that more such studies should be carried out in detail for patients to screen type 2 diabetic patients for depressive symptoms.

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**Conflict of Interest: Nil Source of support:Nil**