

ORIGINAL ARTICLE

Prevalence and Factors Influencing Depression among Diabetes Patients in a Rural Tertiary Care Centre in Tamilnadu

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ABSTRACT

BACKGROUND: Prevalence of diabetes is increasing every year, so does depression, however it goes undetected. Available evidences mostly come from developed nations and there is a paucity of published literature from South India. Having diabetes along with depression is associated with higher risk of suicide and suicidal ideation. While depression may contribute to poor diabetes-related outcomes, diabetes and its complications may also contribute to poor depression outcomes. **AIM:** To assess the prevalence and the factors associated with depression among the patients with type II diabetes mellitus. **MATERIALS AND METHODS:** Single centre, descriptive, cross-sectional study was conducted in a tertiary care teaching hospital for a period of 3 months. 217 type II diabetes patients aged between 18 and 65 years were included in the study. Patients receiving drugs that can affect the mood, those who are diagnosed with psychiatric illness, patients with gestational diabetes and type 1 diabetes were excluded from the study. Physicians Health Questionnaire-9 (PHQ-9) with a score of ≥ 10 was used to make the diagnosis of depression. **RESULTS:** Prevalence of depression among the diabetic patients was 42.3% and based on their scores we graded them as mild, moderate, moderately severe and severe depression and majority (22.5%) of them had the grading between moderate to severe depression. Increasing age, female gender, house wife, high BMI, diabetes duration, diabetes related complications, comorbid conditions and poor glycemic control with poor follow-up are the factors which had influenced the depression among the diabetic patients. **CONCLUSION:** Better outcome in patients overall care and quality of life will be achieved by managing both the depression and diabetes concurrently. Early detection and treatment of depression at the primary care level by effectively screening all diabetic patients for depression would help to bring down the severity of depression among these patients.

Keywords: diabetes, depression, PHQ-9 questionnaire, prevalence.

INTRODUCTION

Diabetes is a chronic ailment which has an ill effect over every system in the human body. The World Health Organization projected in their recent report had projected that 300 million people throughout the world will suffer from diabetes by 2025. India being the capital for diabetes is expected to have 69.9 million diabetic populations by 2025.¹

Depression is another chronic prevailing psychological condition in the world today. Reports had shown that approximately 340 million people

worldwide suffer from depression at any given point of time.^{2,3} It was estimated that depression was the fourth major leading cause of disease burden in women and seventh among men.^{4,5} Major depression was found to be the second leading cause of disability-adjusted life years (DALYs) lost in women and the tenth leading cause of DALYs in men.⁶ India being one of the industrialized country in the world today, the psychological distress is very high which is mostly related to their work place and invariably they become more vulnerable for depression.

Relationship between diabetes and depression has been studied by many researchers. Prevalence of depression among individuals with DM appears to vary by type of DM, race/ethnicity, duration of diabetes, complications due to DM and among developed and developing countries.^{7,8} The prevalence of depression has varied tremendously by definition,

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study design, source of subjects, study area, time frame, and measurement methods in previous studies. Thus, it is difficult to accurately estimate the potential medical care needs and public health burdens of depression in the general diabetic population. A number of studies, including systematic review and meta-analyses, have shown the occurrence of depression among type 2 diabetic patients.⁹

Therefore, screening for depression among diabetic patients should be made routine in our day to day practice. Actually, studies indicated that about 49% of the diabetic patients having severe depression were misrecognized on the primary healthcare clinics.^{10,11} Depression is still largely unrecognized by physicians managing patients with diabetes mellitus (DM).¹² It is estimated that only one-third of people with both DM and major depression are recognized and appropriately treated for both disorders.¹³ In India today majority of the population seek primary health care support for most of their ailments

Having diabetes along with depression is associated with higher risk of suicide, with some reports showing 10-fold increased risk of suicide and suicidal ideation. While depression may contribute to poor diabetes-related outcomes, diabetes and its complications may also contribute to poor depression outcomes.^{14,15}

However, in spite of the huge impact of comorbid depression and diabetes on the individual and its importance as a public health problem, little is known about the magnitude of depression in people with diabetes in India. As of today very few studies had been conducted to assess the prevalence of depression among diabetes patients in India, so this study was aimed in assessing the prevalence and determinants of depression among diabetes patients.

Aim: To assess the prevalence and the factors associated with depression among the patients with type II diabetes mellitus.

MATERIALS & METHODS

Design: Descriptive, cross-sectional, single-centre study of the patients with type 2 diabetes

Study duration and area: The study was conducted from April 2016 to June 2016, at Diabetic OP having 3500 registered patients, handled by the Department of Internal Medicine of Govt. Thanjavur Medical College, Tamil Nadu, South India. It is a teaching hospital catering to suburban and predominantly rural population from four districts.

Study Subjects and Selection: Type 2 diabetic patients, aged between 18 and 65 years were included for the study. Considering the prevalence of depression among diabetes patients as 45%¹⁶ from the previous studies the sample size was calculated as 217 by taking the power of the study as 85% with an allowable error of 15%. We chose a structured questionnaire PHQ-9, because the items match the DSM-IV diagnostic criteria for depression, so the results reflect both a measure of depression severity as well as a categorical DSM-IV diagnosis¹⁷ and were administered by the same investigators.

Data related to socio-demographic, clinical information like BMI, disease duration, complication, co-morbid illness and recent post prandial blood sugar levels, and psychological issues like mental agony in the form of recent financial loss, separation, divorce, family quarrel and death of a close relative, were collected.

All type 2 diabetic patients, both male and female above 18 years of age were included. Patients receiving drugs that can affect the mood, those who are diagnosed with psychiatric illness, patients with gestational diabetes and type 1 diabetes were excluded from the study.

Ethical Statement: An informed consent was obtained from all the participants after they were given a verbal and written explanation of the research objectives; they did not receive any economical remuneration. This study complied with the principles convened in the Helsinki Declaration and duly approved by the institution's ethical committee.

Statistics Evaluation: Statistical Analysis carried out by Statistical Package of Social Studies (SPSS) version 21, Chicago, Illinois, USA. Chi-square test was used to

assess the association between the various factors and the occurrence of depression among the diabetic patients.

RESULTS

Table 1: Demographic profile among the study population

Demographic factors	n=217	Percentage
Age		
Below 40yrs	23	10.5%
40 to 50yrs	84	38.7%
50 to 60yrs	62	28.5%
Above 60yrs	48	22.1%
Gender		
Male	104	47.9%
Female	113	52%
Marital Status		
Single	15	6.9%
Married	202	93%
Habitat		
Urban	64	29.4%
Rural	153	70.5%
Religion		
Hindu	195	89.8%
Islam	11	5%
Christian	11	5%
Education		
Illiterate	49	22.5%
Primary	56	25.8%
Middle school	86	39.6%
Higher Secondary & above	26	11.9%
Occupation		
Unskilled labor	17	7.8%
Semi-skilled	108	49.7%
Skilled	21	9.6%
Home maker	71	32.7%
Monthly Income		
Below 5 k	151	69.5%
5 to 7 k	26	11.9%
Above 10 k	40	18.4%
Family members		
Below 4	139	64%
4 to 6	62	28.5%
Above 6	16	7.3%

Table 1 shows the demographic factors of the study subjects. It is shown from the table that majority of the study subjects were above 50 years of age and the females are slightly more in number than the males with a M:F ratio of 0.92:1. Majority of them were married and belong to rural area. 50% of the subjects were educated upto middle school and above and 50% of them were semi-skilled labourers with a monthly income of less than five thousand. Most of them were living as a nuclear family. For 47.9% of the study subjects their BMI was more than 25 and about 50% of them were having diabetes for less than 5 years. Very less number (9.6%) of our diabetic patients had diabetic related complications and the most common co-morbid condition which

was reported among our patients was hypertension. Most of the patients had a good compliance (67.7%) and follow-up and 63.5% of the study subjects had their post prandial blood sugar of more than 200mg/dl at the time of our examination (table 2).

Table 2: Distribution of the study subjects based on their clinical variables

Clinical Variables	n=217	Percentage (%)
BMI		
Below 25	113	52%
Above 25	104	47.9%
Duration of Diabetes		
Below 5 years	108	49.7%
5 to 7 yrs	46	21.1%
7 to 10 yrs	63	29%
Diabetic complications		
Yes	21	9.6%
No	196	90.3%
If yes (n=21)		
PNS	12	57.1%
Retinopathy	6	28.5%
DFS	3	14.2%
Co-morbid Illness		
No Illness	125	57.6%
SHT	72	33.1%
Hypothyroid	14	6.4%
Asthma	6	2.7%
Compliance & Follow Up		
Yes	147	67.7%
No	70	32.2%
Recent PPBS		
Below 200mg	138	63.5%
Above 200mg	79	36.4%

In our study the prevalence of depression among the diabetic patients was 42.3% and based on their scores we graded them as mild, moderate, moderately severe and severe depression and majority (22.5%) of them had the grading between moderate to severe (table 3).

Table 3: Distribution of the study subjects based on their levels of depression

Level of depression	Frequency (n=217)	Percentage
No depression (0 – 4)	125	57.6%
Mild depression (5 – 9)	16	7.3%
Moderate depression (10 – 14)	27	12.4%
Moderately severe (15 – 19)	22	10.1%
Severe depression (20 – 27)	27	12.4%
Total	217	100%

Of the various demographic factors we found that as the age of the patients increases a strong association was seen in the occurrence of depression similarly female gender, lower educational and economic status and semiskilled and homemakers found to have a strong significant association (p<.05) for

developing depression among the diabetic patients and also people who are living as

a nuclear family found to have a strong association for depression (table 4).

Table 4: Demographic factors and the level of depression among the study subjects

Demographic factor		Depressed (n=92) (%)	Not depressed (n=125) (%)	Chi-square value	P value
Age	Below 40yrs (n=23)	3 (13%)	20 (87%)	16.874	<.0001
	40 to 50yrs (n=84)	23 (27.3%)	61 (72.6%)		
	50 to 60yrs (n=62)	27 (43.5%)	35 (56.4%)		
	Above 60yrs (n=48)	39 (81.2%)	9 (18.7%)		
Gender	Male (n=104)	38 (36.5%)	66 (63.4%)	7.883	<.005
	Female (n=113)	54 (47.7%)	59 (52.2%)		
Habitat	Urban (n=64)	28 (43.7%)	36 (56.2%)	2.842	0.148
	Rural (n=153)	64 (41.8%)	89 (58.1%)		
Religion	Hindu (n=195)	89 (45.6%)	106 (54.3%)	9.258	<.01
	Islam (n=11)	2 (18.1%)	9 (81.1%)		
	Christian (n=11)	1 (9%)	10 (91%)		
Education	Illiterate (n=49)	30 (61.2%)	19 (38.7%)	16.583	<.0001
	Primary (n=56)	33 (58.9%)	23 (41%)		
	Middle school (n=86)	24 (27.9%)	62 (72%)		
	Higher Secondary & above (n=26)	5 (19.2%)	21 (80.7%)		
Occupation	Unskilled labor (n=17)	6 (35.2%)	11 (64.7%)	9.842	0.0274
	Semi-skilled (n=108)	51 (47.2%)	57 (52.7%)		
	Skilled (n=21)	2 (9.5%)	19 (91.5%)		
	Home maker (n=71)	33 (46.4%)	38 (53.5%)		
Income	Below 5 k (n=151)	76 (50.3%)	75 (49.6%)	13.872	<.0001
	5 to 7 k (n=26)	9 (34.6%)	17 (65.3%)		
	Above 10 k (n=40)	7 (17.5%)	33 (82.5%)		
Family members	Below 4 (n=139)	76 (54.6%)	63 (45.3%)	15.294	<.0001
	4 to 6 (n=62)	14 (22.5%)	48 (77.4%)		
	Above 6 (n=16)	2 (12.5%)	14 (87.5%)		

Among the various clinical parameters we found a strong statistical significant association (p<.01) for patients with BMI of more than 25, duration of diabetes for more than seven years, current post prandial blood sugar of more than 200 mgs/dl, with a poor compliance towards diabetic management, with diabetic related complications and comorbid conditions for the occurrence of depression among the diabetic patients (table 5).

Table 5: Association of depression with various clinical factors among the study subjects

Clinical variables		Depressed (n=92) (%)	Not depressed (n=125) (%)	Chi-square value	P value
BMI	<25 (n=113)	37 (32.7%)	76 (67.2%)	10.915	<.001
	>25 (n=104)	55 (52.8%)	49 (47.1%)		
Duration of diabetes	Below 5 years (n=108)	39 (36.1%)	69 (63.8%)	14.182	<.001
	5 to 7 yrs (n=46)	22 (47.8%)	24 (52.1%)		
	7 to 10 yrs (n=63)	31 (49.2%)	32 (50.7%)		
Diabetes complications	Present (n=21)	16 (76.1%)	5 (23.8%)	8.343	<.005
	Absent (n=196)	76 (38.7%)	120 (61.2%)		
Co-morbid conditions	No Illness (n=125)	52 (41.6%)	73 (58.4%)	6.017	<.05
	SHT (n=72)	32 (44.4%)	40 (55.5%)		
	Hypothyroid (n=14)	6 (42.8%)	8 (57.1%)		
	Asthma (n=6)	2 (33.3%)	4 (66.6%)		
Compliance and follow-up	Regular (n=147)	50 (34%)	97 (65.9%)	11.372	<.0001
	Irregular (n=70)	42 (60%)	28 (40%)		
Recent PPBS	Below 200mg (n=138)	49 (35.5%)	89 (64.4%)	13.581	<.0001
	Above 200mg (n=79)	43 (54.4%)	36 (45.5%)		

DISCUSSIONS

Depression being one of the major psychiatric disorders would have a negative effects towards the quality of life, treatment outcome and medication adherence of patients with diabetes. The prevalence of depression among the participants in the current study was found to be 42.3%. A rising trend in prevalence

of depression in diabetic patients has been suggested by the studies done in various parts of the world as well as in India. In a population-based study in Chennai the prevalence of depression was 23.4%.¹⁸ Raval *et al.* found a very high prevalence (41%) of depression in 300 patients with type 2 diabetes in a tertiary care hospital in Northern India.¹⁹ Another study conducted

at a tertiary care center found the prevalence of depression in T2DM patients to be 16.9%.²⁰ A multicentric study done in Pakistan found the prevalence was 43.5%²¹ and few other studies found that prevalence of depression in T2DM ranges from 13.6% to 67.5%.^{22,23} However the western studies which was done in US and UK reported the prevalence of depression among diabetic patients had ranged between in patients 30% and 83%.^{24,25} The varying rates of prevalence may be accounted for methodological differences such as self-reported depressive symptoms versus clinically diagnosed depression with many number of depression scales being used. In addition, many of the studies have not documented some of the important clinical factors like number of diabetes related complications and the presence of other co-morbid conditions which would have a confounding effect over the results. The prevalence of severe depression which was 12.4% in this study was lower than the observations made in the above studies where it ranged from 18 to 20%.^{26,27} A number of risk factors in the current study were found to be associated with depression. Patients aged above 60 years were found to be significantly more depressed than patients of other age groups. This could probably be because people of this age group are usually retired and they become a totally dependent population for all their social and economic needs. However several other studies have reported no association between age and prevalence of depression among T2DM patients.^{28,29} It has been found in the present study that depression was more significant among female patients which has been supported by other studies.³⁰⁻³² It is known that major depression occurs twice as frequently in women than in men and seems to be influenced by estrogen levels and to an extent females would be more emotional and extroverted. Educational status was found to have a statistically significant association with depression in the present study which is consistent with the findings of few other studies.^{33,34} But few studies had shown that there was no association

between the two.³⁵ In the present study, occupation was also found to be a risk factor. Depression was found to be more among patients who were doing unskilled and semi-skilled workers. This could be probably due to financial burden imposed by the disease on these groups. In a study done in Bangladesh housewives were found to suffer the most from severe depression, whereas retired persons were found to suffer the most from mild to moderate depression ($P < 0.05$). This study reported that overall depression was highest among housewives and lowest among businessmen²⁶ and in the current study also we found depression to be high among the housewives. In the present study the prevalence of depression was found to be less among people living in joint family than the people living as a nuclear family and it was in par with the study done by Bagadia VN et al.³⁶

Patients who were overweight (BMI >25) were found to be significantly more depressed than patients of normal weight or underweight (BMI <25) in the present study. A number of other studies also found statistically significant association between obesity (BMI ≥ 30 kg/m²) and depression among T2DM patients.^{37,38} In a study done in Chandigarh it was observed that presence of neuropathy, nephropathy and diabetic foot disease was significantly associated with depression among diabetic patients¹⁹ and in par with the study our study also had shown a statistically significant association in the development of depression among patients with diabetes related complications.

The present study had shown that the patients with other co-morbid conditions like hypertension and hypothyroidism are more prone for depression than the patients without any other co-morbid illnesses and similar results are quoted by Jose et al in his study.³⁹

Poor control of blood sugar and irregular follow-up of patients with diabetes are the other factors which had influenced in the development of depression in our study but it was contradicted by a study done by Nitin Joseph et al¹⁶ where he found that tight blood sugar control had no influence

over depression among the diabetic patients but many studies had proven a significant association between the blood glucose level or HbA1c level and depression.^{40,41}

CONCLUSION

Depression is well recognized to be associated with chronic diseases and nonpsychiatric medical illness. Our study had proven that the prevalence of depression among diabetic patients was comparatively high. So it is important for us to understand the disease and plan mental services for diabetic patients. Early detection and treatment of depression will lead to improve in glycemic control. Better outcome in patients overall care and quality of life will be achieved by managing both the depression and diabetes concurrently. However further study need to be done to clarify the association between the two and help those at primary care level to design an appropriate intervention program.

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