

Assessment of depression as a comorbidity in patients of diabetes mellitus

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Abstract

Introduction: The prevalence of diabetes mellitus has reached epidemic levels globally. Depression as a comorbidity in patients with Diabetes Mellitus has been reported by many studies. The coexistence of diabetes and depression is associated with significant morbidity, mortality, and increased healthcare cost. The reports of studies are conflicting and the exact mechanisms linking depression and diabetes are unclear.

Aim and Objective: The aim of the study was to determine the prevalence as well as the correlation of depression with socio demographic profile, duration of disease state, presence of complications and effect of therapeutic intervention in patients with Diabetes mellitus.

Materials and Methods: A cross sectional survey was conducted with an aim of assessing depression as a comorbidity in patients with diabetes mellitus. Depression was assessed using the patient health questionnaire-9 (PHQ-9).

Results: Depression as defined by PHQ score ≥ 5 was present in 45% of the individuals. Severe depression (PHQ score ≥ 15) was present in 8% subjects, moderate depression (PHQ score ≥ 10) in 14% subjects, and mild depression was present in 23% of subjects. Coexisting depression in patients with diabetes was associated with decreased adherence to treatment, poor metabolic control, higher complication rates, decreased quality of life and increased disability. Depression was significantly more prevalent in rural subjects (59%) as compared to urban ones (26%).

Conclusion: Coordinated strategies for clinical care are necessary to improve clinical outcomes and reduce the burden of illness. Currently, recognition of depression among individuals with diabetes is suboptimal, therefore global approaches to establish coordinated, multifaceted interventions to improve early recognition of depression and early initiation of treatment for depression are required to reduce the worldwide burden of depression among individuals with diabetes.

Keywords: Diabetes mellitus, Depression, PHQ- Patient health questionnaire.

Introduction

Diabetes and Depression are major worldwide health problems responsible for profound morbidity and mortality in the general population. The global prevalence of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% in the adult population.¹ As per International Diabetes Federation report, there were 366 million people with diabetes in 2011, and this number is estimated to rise to 552 million by 2030.² Depression as a comorbidity in patients with Diabetes Mellitus, has been reported by many studies. Approximately 340 million people worldwide are suffering from depression including 18 million in the United States.³ Patients with diabetes mellitus are twice at risk of developing depression than the general population.⁴ The worldwide prevalence of depression amongst individuals with diabetes appears to vary by diabetes type and amongst developed and developing nations.

Depression is a modifiable risk factor for diabetes mellitus and diabetes as a chronic illness increases the risk of onset of depression. A bidirectional causal relationship exists between diabetes and depression. Both these disorders are projected to be among the five leading causes of disease burden by 2030.⁵ Data explaining the true prevalence and the correlations of

depressive symptoms with diabetic, or the socio-demographic profile are either limiting, or the reports have been conflicting. The recognition and addressal of this association can have profound implications on prevention and treatment of these disorders.

Aims

In the light of the above-mentioned facts the study was aimed to recognize and address the association of depression as a comorbidity in patients of diabetes mellitus.

Objective

1. To determine the presence of depressive symptoms in patients of diabetes mellitus
2. To determine the correlation of depressive symptoms (if present) with socio demographic profile, disease history and the presence of complication in Diabetic individuals.
3. To address the association of depression as a comorbidity in diabetic individuals.

Study design

After the approval from Institutional ethical committee, a cross-sectional survey was conducted for

3 months from including the clinically proven cases of diabetes mellitus in the age range of 25-75 years attending the wards and medical OPD units.

Inclusion criteria: The patients:

1. with fasting glucose > 126 mg/dl, or
2. with random blood glucose > 200 mg/dl, or
3. known diabetic on regular treatment, or
4. Known diabetic with one or more complications were included as subjects of the study.

Exclusion criteria: The undiagnosed or suspected cases of diabetes mellitus, patients on antidepressant drugs or with a family history of depression; and the patients with gastrointestinal, pulmonary, hepatic, renal, dermatological, musculoskeletal, or other comorbidities were excluded from the study.

Materials and Methods

A written informed consent was taken from all the study subjects. The Patient Health Questionnaire-9 (PHQ-9) (Table-1) was used for the assessment of depressive symptoms. The PHQ-9 is the depression module, which scores each of the 9 DSM-IV criteria as 0 = not at all, 1 = several days, 2 = more than ½ of the days, 3 = nearly every day.⁶ The study instrument was piloted on several individuals and validated for suitability.

The symptoms experienced by participants during the 2-week period before the survey were assessed. Based on participant's responses to the frequency of any symptom, a total score ranging from 0 to 27 was obtained. PHQ-9 scores of (1-4), (5-9), (10-14), (15-19) and (20-27)-represented minimal, mild, moderate, moderately severe, and severe depression, respectively.⁶

The correlation of depressive symptoms was determined with socio-demographic profile, vigorous

physical exercise (at least once a week), daily consumption of alcohol, BMI (body mass index), disease history, presence of hypertension, and diabetes related complications.

The fasting blood glucose (GOD-POD method) and HbA1c (capillary electrophoresis) levels were estimated for all the study subjects.

Statistical analysis

Data were analyzed using IBM SPSS statistic software version 24.0 for Windows. Numerical data were presented as mean ± standard deviation or percentages. Differences in characteristics between participants were tested with unpaired t-test for normally distributed variables, with the Wilcoxon rank sum test for skewed variables, and with the Chi-square test for categorical variables. The significance level was set at 5%.

Results

A total of 200 diabetic patients participated in the study. Their baseline characteristics and disease statistics have been shown in **Table 1 and 2** respectively. 45% of the diabetic subjects were found with depressive symptoms ranging from minimal to severe. Moderate depression was observed in maximum number of study subjects (**Table 3**). The variables such as advancing age, female gender, rural background, alcohol consumption, cigarette smoking, physical inactivity and obesity were found as the major determinants of depression. Statistically highly significant variations in PHQ-9 scores were observed in these categories. (**Table 4**). PHQ score positively correlated with BMI, Glycated Hb and duration of diabetes.

Table 1: Baseline characteristics

Attributes	Groups	Number of subjects (Total- 200)	Percentage
Age (Mean -64.8± 6.8)	25-50	60	30
	51-75	140	70
Gender	Males	86	43
	Females	114	57
Education	Uneducated	34	17
	Educated	166	83
Social status	Married	160	80
	Single	33	16.5
	Divorced	7	3.5
Place of residence	Rural	68	34
	Urban	132	66
Professional information	Employed	154	77
	Unemployed	46	23
Smoking	Non-Smoker	126	63
Daily Alcohol Consumption	Non-Alcoholic	89	44.5

	Alcoholic	111	55.5
Vigorous physical exercise at least once a week	No Exercise	121	60.5
	Some Exercise	79	39.5
BMI-Body Mass Index (Kg/m2)	<30	42	21
	>30	158	79

Table 2: Disease statistics

Attributes	Groups	Number of subjects (Total-200)	Percentage
Type of diabetes	Type 1	23	11.5
	Type 2	177	88.5
Duration of Diabetes	< 5 years	98	49
	> 5 years	102	51
Family history of diabetes	Positive	86	43
	Negative	114	57
Hypertension	Present	89	44.5
	Absent	111	55.5
Diabetic complications	Present	91	45.5
	Absent	109	54.5
HbA1c	< 6	30	15
	>6-10	110	55
	>10	60	30

Table 3: Prevalence of Depression in diabetic patients

Score	Interpretations	Number of subjects	Percentage
1-4	Minimal	18	9
5-9	Mild	22	11
10-14	Moderate	32	16
15-19	Moderately Severe	16	8
20-27	Severe	2	1
Total prevalence	Minimal- Severe	90	45

Table 4: Association of variables with PHQ-9 score

Variable	P value
Age	0.025
Female	<0.001
Married	<0.001
Rural	<0.001
Educated	<0.001
Smoking	<0.001
Daily consumption of Alcohol	<0.001
No Physical exercise	<0.001
BMI->30	<0.001
Family history of diabetes	<0.01
Duration of disease	<0.01
Fasting blood glucose	0.08
HbA1c	<0.01

Discussion

Out of the total 200 patients, 90 (45%) were found with symptoms of depression. Similar results have been reported by many other studies.⁷⁻¹⁰ The studies have

reported higher risk of developing depression in persons with diabetes than the general population.¹¹ A meta-analysis of 42 published studies that included 21,351 adults found that the prevalence of major depression in people with diabetes was 11% and the

prevalence of clinically relevant depressive symptoms was 31%.¹²

The prevalence of depression among females was higher than their male counterparts with diabetes. The higher prevalence among females with diabetes than their male counterparts with diabetes has been reported by several studies.¹² Multiple reasons could be attributed to this observation: stress of family, workplace based stress, lifestyle, and socio-economic factors.

A higher prevalence of depression was observed in diabetics with a rural background, as compared to urban ones, and the difference was statistically significant. It may be related to socioeconomic status. The individuals with low socio-economic status face the dual burdens of paying for health care, and meeting the needs of their families. The diagnosis of T2DM and its poor understanding in rural areas may be an additional stress causing depression in these people.¹⁰

Statistically significant variations were observed between depression and advancing age, family history of diabetes, duration of disease, glycemic control, and microvascular complications. The prevalence of depression in patients with type 2 diabetes mellitus was higher than type 1, and the differences were highly significant statistically. The greater risk of type 2 diabetes in individuals with depression is believed to result from an increase in counter-regulatory hormone release and function, alterations in the glucose transport system, and increased immune-inflammatory activation.¹³ These physiologic alterations are thought to contribute to insulin resistance and beta islet cell dysfunction, which ultimately leads to the development of type 2 diabetes. Different forms of emotional stress are associated with an increased risk for the development of type 2 diabetes, particularly depression, general emotional stress, anxiety, anger/hostility, sleep disturbances and workplace based stress.

Studies have reported a bidirectional pathway between diabetes and depression. Depression in individuals with both type 1 and type 2 diabetes is a result of chronic psychosocial stress of having a chronic medical condition.¹⁴ Insulin resistance and resultant hyperglycemia often resolve when patients recover from depression.^{15,16}

The higher risk of complications and poor quality of life in diabetic patients with depression as comorbidity has been reported by a number of studies. Patients with coexisting diabetes and depression have shown poor self-management by not sticking to a strict diet regimen, maintaining good physical activity, checking blood glucose levels on a regular basis and refilling medications.^{17,18} These individuals are also more likely to have 3 or more cardiac risk factors (obesity, sedentary life style, smoking, impaired glucose tolerance) compared to patients with diabetes alone.^{19,20}

To summarize, Depression in patients with diabetes mellitus represents a complex phenomenon which is the result of complicated interactions between biological, genetic and psycho-social factors. It is important to diagnose and treat depression at an early stage in the diabetic population as this seems to have positive effects on both depressive symptoms and glycemic control.

Conclusion

There is high prevalence of depression in individuals suffering from Diabetes mellitus in North Indian population. Depression should be assessed in all patients with diabetes, irrespective of gender, duration of diabetes, glycemic control or presence/absence of microvascular complications.

Recommendations

Currently, recognition of depression among individuals with diabetes is suboptimal. Global approaches to establish coordinated, multifaceted interventions to improve early recognition of depression and early initiation of treatment for depression are required to reduce the worldwide burden of depression among individuals with diabetes.

Conflicts of interest: None

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Annexure: Patient health questionnaire (9)

PHQ-9 (Over the last two weeks, how often have you been bothered by any of the following problems?)

S. No.	Context	Not at all (0)	Several Days (1)	More than half the days (2)	Nearly every day (3)
1	Little interest or pleasure in doing things?				
2	Feeling down, depressed, or hopeless?				
3	Trouble falling or staying asleep, or sleeping too much?				
4	Feeling tired or having little energy?				
5	Poor appetite or overeating?				
6	Feeling bad about yourself - or that you are a failure or have let yourself or your family down?				
7	Trouble concentrating on things, such as reading the newspaper or watching television?				
8	Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual?				
9	Thoughts that you would be better off dead, or of hurting yourself in some way?				
	Total score				