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PREVALENCE OF DEPRESSION IN PATIENTS WITH TYPE 2 DIABETES MELLITUS IN GUJARAT REGION

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ABSTRACT

Background: Patients with diabetes are more likely to experience depression than the population in general. Any level of depression is associated with worse diabetes outcomes, poorer quality of life, increased functional impairment, increase in death rate and increased rate of complications like blindness and heart disease. Any patient who is having poor diabetes control should be screened for depression.

Objective: To find out the score of Patient Health Questionnaire to assess the depressive symptoms in the type 2 diabetes mellitus patient and the association between fasting blood sugar and depressive symptoms and between age and depressive symptoms.

Materials and Methodology: 200 patients having diagnosed type 2 diabetes mellitus filled the PHQ form. The PHQ score was assessed for the prevalence of depression in the patients.

Result: Result showed that 54% patients have minimal depressive symptoms. 27% patients have minor depression and 12% have moderately major depression. 2% of the patients have severe major depression.

Conclusion: There was significant prevalence of depression in type 2 diabetes mellitus patients. The depressive symptoms are associated with age and fasting blood sugar of the patients.

Keyword: depression, diabetes mellitus

INTRODUCTION

The term diabetes mellitus describes a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both. Diabetes mellitus may present with characteristic symptoms such as thirst, polyuria, blurring of vision, and weight loss⁽¹⁾ International Diabetes Federation (IDF) reported that the total number of diabetic subjects in India is 41 million in 2006 and that this would rise to 70 million by the year 2025.^{(3) (4)}

Risk factors for type 2 diabetes mellitus are following;⁽⁶⁾⁽⁷⁾⁽⁸⁾

Age >45 years

Gestational Diabetes

Body mass index ≥ 25 kg/m²⁽⁴⁸⁾

Family history of diabetes

HDL cholesterol <35 mg/dL

Blood levels of triglycerides > 250 mg/dL

Blood pressure >140/90 mmHg

Impaired glucose tolerance

Impaired fasting glucose: FPG from 110 to <126 (6.1 to 7.0 mmol / L)

Impaired glucose tolerance: 2hr PPG from 140 to <200 (7.75 to <11.1 mmol /L)⁽⁴⁸⁾

Low activity level (exercising <3 times a week)

A condition called acanthosisnigricans.⁽²⁾

Micro vascular complications are Retinopathy, Nephropathy, and Neuropathy. Macro vascular complications are Coronary artery disease (CAD),

Peripheral vascular disease (PVD), Cerebrovascular events (CVA). Other complications are psychological complications, includes depression and anxiety.⁽⁹⁾

Type 2 diabetes has been associated with reduced performance on multiple domains of cognitive function, including memory, psychomotor efficiency and executive function.⁽¹⁴⁾ Glucose is the predominant substrate of the brain, and its consumption is tightly linked to neuronal activity, leaving neuronal function highly dependent on a continual supply of glucose. Changes in higher brain functions, such as memory and mood are associated with fluctuations in the circulating glucose concentration.⁽¹⁵⁾ Compared with patients with diabetes alone, patients with depression and diabetes have been shown to have poorer self-management and poor adherence to anti-diabetic, lipid-lowering and antihypertensive treatment. Depression may be an important barrier to effective diabetes management. Patients with depression and diabetes are more likely to have higher macro vascular and micro vascular complications and higher mortality rates.⁽⁵⁾

Depression is twice as much common in people with diabetes as in the general population and major depression is present in at least 15% of patients with diabetes. Depression is associated with poorer glycaemic control, health complications, poor quality of life and increased healthcare costs. People with diabetes should be screened for depression regularly⁽⁹⁾

The occurrence of depression in individuals with diabetes mellitus seems to be related to socio-economic status, family status, obesity, smoking habits, physical activity, and sedentary life⁽¹⁰⁾ People with type 2 diabetes are 52% more likely to become depressed than people without the condition.⁽¹¹⁾

Objective of the study is to explore the risk of depressive disorder in the type 2 diabetes patients in Ahmadabad. Depression leads to the poor outcome of the treatment of impaired glucose tolerance.⁽¹³⁾

Compared to subjects with normal individual:

Depression alone increased risk of all-cause mortality by 53%, and cardiovascular mortality by 56%.

Diabetes alone increased risk of all-cause mortality by 52%, and cardiovascular mortality by 146%.

Those who had lived with diabetes for more than ten years combined with depression more than tripled their risk of death from cardiovascular disease.⁽¹³⁾

Depression, in this survey, is assessed by administering nine items PHQ-9, a self report version of questionnaire, which assess the presence of depressive disorder.⁽⁵⁾

MATERIAL AND METHADODOLOGY

- **Source of data** - Population of Ahmadabad
- **Study design** - Survey study
- **Study duration** - The total duration of the study was 6 months
- **Sample size** - 200 subjects

Inclusion Criteria

1. Age group of 40-70 years
2. Patients with laboratory diagnosis of type 2 diabetes mellitus
3. Both genders (male & female)

Exclusion Criteria

1. History of any psychological illness
2. Associated medical condition

Data collection and procedure

Material

Consent form

Data collection sheet

Outcome measure

A Patient Health related Questionnaire (PHQ) in local language (Gujarati)⁽¹⁶⁾

PROCEDURE

A Patient Health related Questionnaire (PHQ) in local language (Gujarati) was filled by the patients

regarding the symptoms of depression. 200 subjects of diabetes mellitus had filled the PHQ-9 form. This questionnaire includes questions about depressive symptoms and effective screening tool exists to aid recognizing depression in the primary care setting. ⁽¹⁶⁾ Data will be collected from different areas of Ahmadabad city in Gujarat. Data was analyzed using Graph pad Prism 5.1. Prevalence of depression was figured out. Correlation between age, fasting blood sugar and depressive tendency was calculated $p < 0.05$

RESULT

Gender division for 200 diabetics is as in table 1. According to the age, the patients are divided into 4 groups. (Table 2)

3% patients were in age group of 30-39 years.

33% patients were in age group of 40-49 years

40% were in the age group of 50-59 years.

24% patients were in the age group of 60-69 years. (As shown in graph 1)

The mean Fasting Blood Sugar (FBS) of the patients was 123.2 ± 11.32 . The average depression score of all 200 diabetics was 8.485 ± 3.779 as shown in table 3. The highest number of diabetics were in age group of 50-59 years as shown in table 3

54% diabetics have PHQ score 5-9. These patients have minimal depressive symptoms.

1% of the diabetics fall in group 5 (PHQ score ≥ 20) having severe major depression

6% diabetics fall in group 4 (PHQ score 15-19) having moderately severe depression.

27% of the diabetics fall in group 3 (PHQ score 10-14) having minor depression.

12 % diabetics fall in group 1 (PHQ score 0-4) having no depressive symptoms as shown in table 4 & in graph 2.

Males and females in each group of PHQ score are as shown in table 5. 59 % male having diabetes fall in group 2 (PHQ score 5-9). 47 % female having diabetes fall in group 2 (PHQ score 5-9). 24% of males and 30% of females have minor depression. While 5% of male and 8% of females

have moderately severe major depression. (Graph 3) In both gender, p PHQ score ≥ 10 is the sign of depression. So the prevalence of depression in male is 30% and prevalence of depression in female is 39%, which is higher than males.

Correlation of Age vs. Depression (PHQ score) and Correlation of fasting blood sugar vs. depression is analysed by the Pearson correlation test as shown in table 6 & 7. This result suggests a weak but positive correlation between age and depression and weak but a positive correlation between fasting blood sugar and depression score (Graph 4 & 5). ($p < 0.05$)

DISCUSSION

This is the survey study presenting the prevalence of depression in type 2 diabetes mellitus patients in the age group of 30-70 years (mean age 52.83 years). The findings of the current study showed that 54% of minimal depressive symptoms, 27% minor depression, 6% of major depression and 1% of severe major depression are there in subjects with type 2 diabetes mellitus.

The relationship between diabetes mellitus and depression has been the subject of many researches and meta-analysis. It is debatable whether diabetes causes depression or not. Many studies went further to investigate the possibility of depression as a risk factor for developing diabetes. However, the results are inconsistent. While most studies found that depression is highly prevalent among people with diabetes in different cultural settings when compared to non-diabetics; other large studies found that diabetes does not increase the risk or the risk is increased only in the presence of other co-morbidities. ⁽¹⁷⁾

Lustman and his colleagues conducted a meta-analytic review of 24 studies. Their review revealed a strong association between depression and glycaemic control. ⁽¹⁸⁾

Ikeda and her associates found a significant relationship between the measures of depression and blood glucose levels in a sample of 113 type 2 diabetic patients. ⁽²⁰⁾

In a study Jameel Nasser *et al* showed prevalence of depression among the study participants was 33.3%. Author suggested that, there was no association between diabetic control, duration, and most diabetic complications, which is not a supported result to our findings.⁽⁴⁹⁾ but population were different from our study.

Pirunee Suppasso had done a study on 330 type 2 diabetic patients, prevalence of depression in Phangkhon hospital, Thailand. The study suggested that prevalence of depression among type 2 diabetic patients in Phangkhon hospital was mostly in women and mild depression.⁽³⁶⁾ The risk of suicidal was mild. The factors of depression were sex, age, coexisting chronic conditions and duration of diabetes.⁽¹⁷⁾

It is suggested in a study by Gonzalez JS *et al*, patients with diabetes mellitus are more likely to experience depression than the population in general. Up to 20% of diabetics have major depression and over 66% have some degree of depression.⁽²²⁾ This is because of worse diabetes outcomes, poorer quality of life, increased functional impairment, increase in death rate and increased rate of complications like blindness and heart disease.⁽²⁰⁾⁽²¹⁾ In addition the cost of care is higher, self-care is poorer, and adherence to life style changes.⁽²²⁾

P J Lustman suggested that depression may occur secondary to the advancing diabetes or to diabetes-related abnormalities in neuro-hormonal or neurotransmitter function.⁽²³⁾

Ryan J. Anderson *et al* concluded in a met analysis that there are more others factors affect the prevalence of depression in diabetes like ethnicity, age, sex, duration of diabetes and its complications.⁽¹⁴⁾

A recent meta-analysis reviewed 13 articles that predicting onset of diabetes, representing 6,916 cases. The study found that depressed patients have a 1.6 times or 60% greater risk of developing type 2 diabetes mellitus.⁽²²⁾

A second study demonstrated that for each five-point increase in score on a depression

questionnaire the risk of developing diabetes increased by 10%.⁽²²⁾

Prevalence of minor depression in females is more than in males in this study, which is supported by a met analysis conducted by Ryan J. Anderson *et al*.⁽¹⁴⁾

The association between depression and diabetic complications, both macro vascular and micro vascular, has been reviewed by a meta-analysis of 27 studies, which involved both type 1 and type 2 diabetes. The analysis demonstrated a significant and consistent association between diabetic complications and depression.⁽¹⁴⁾⁽²⁴⁾⁽²⁵⁾

In a study done by Wayne Katon *et al*, it is concluded that smoking and obesity were associated with a higher likelihood of meeting criteria for major and minor depression. Diabetes complications and elevated HbA1C were associated with major depression. Older patients with a higher number of complications had an increased likelihood of minor depression.⁽²⁶⁾

Similar findings found in study by Nabil Sulaiman *et al*, that a correlation between mental health status and diabetic complications.⁽²⁷⁾ According to Palinkas L.A. *et al*, poor health and age of the patient is associated with the depressive symptoms in patients with diabetes mellitus.⁽²⁸⁾

Thus result of the study showed that there was prevalence of depression in type 2 diabetes mellitus. The results also showed that the age and the fasting blood sugar of the patients were associated with depression.

Limitations of the study were

- Due to the short duration of the study the sample size was small.
- The data about diabetic complications and duration of diabetes were not assessed.
- Other factors like socio-economic status and lifestyle were not assessed.
- The data about patients taking drugs or on insulin injections was not assessed.

Future Research may be on-

- Prevalence of depression in patients with controlled and uncontrolled type 2 diabetes mellitus.
- Prevalence of depression in patients with type 2 diabetes mellitus according to body mass index and sex.
- Effects of aerobic exercise in patients with depression induced by type 2 diabetes mellitus

CONCLUSION

- Study concludes that patients with type 2 diabetes mellitus are more prone to develop depression.
- Study also concludes that females are more prone to develop depression compared to male, having type 2 diabetes mellitus.
- Results of the study showed that there is weak but a positive correlation between age and depression and also between fasting blood sugar and depression.
- This study concludes that the prevalence of depression in diabetes increases risk of co morbidity.

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Table 1: Number of patients in each gender group

	Male	Female
Number of patients	123	77

Gender division for 200 diabetics is 77 (38.5 %) female and 123(61.5 %) male participated in this study.

Table 2: Number of patients in each age group

Age	Number of patients
30-39	6 (3%)
40-49	66 (33%)
50-59	80 (40%)
≥60	48 (24%)

Table 3: Mean age, mean fasting blood sugar and mean PHQ score

Number of patients	Mean age (years)	Mean FBS	Mean PHQ score
200	52.83±7.260	123.2±11.32	8.485±3.779

There are 200 diabetes patients having mean age (52.83 ± 7.260).

The mean Fasting Blood Sugar of the patients was (FBS) 123.2 ± 11.32 .

The average depression score of all 200 diabetics was 8.485 ± 3.779 .

Table 4: Prevalence of depression in diabetic patients

	Group 1	Group 2	Group 3	Group 4	Group 5
PHQ score range	0-4	5 – 9	10-14	15-19	≥20
Prevalence of depression	12%	54%	27%	6%	1%

Table 5: Males and females in each group of PHQ score

Groups	Group 1	Group 2	Group 3	Group 4	Group 5
PHQ score	0-4	5-9	10-14	15-19	≥20
Male	13 (11%)	73 (59%)	30 (24%)	6 (5%)	1 (1%)
Female	11 (14%)	36 (47%)	23 (30%)	6 (8%)	1 (1%)

Table 6: Correlation of Age vs. Depression (PHQ score)

Number of subjects	Pearson r	95% confidence interval	P value (two-tailed)	R square
200	0.2898	0.1574 to 0.4120	< 0.0001	0.08399

Correlation of fasting blood sugar vs. depression is analysed. Correlation co-efficient for age vs. depression is 0.2898 and $p < 0.0001$.

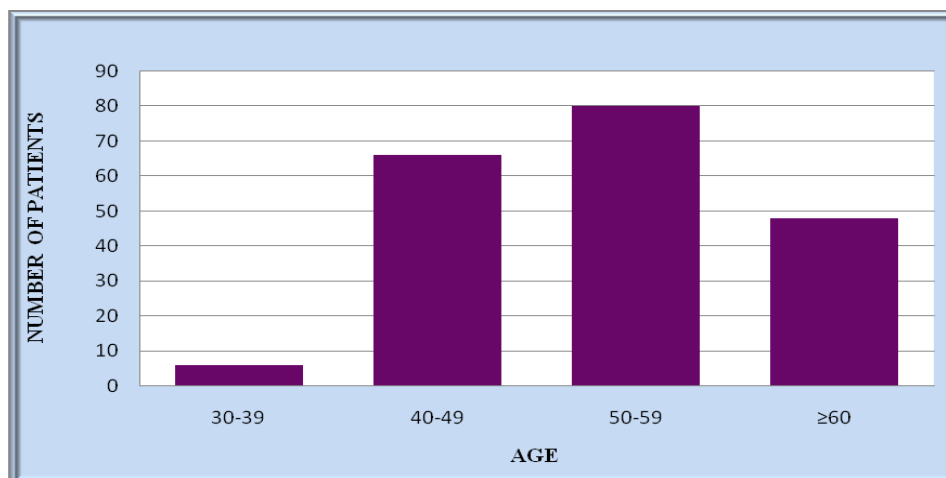
This result suggests a weak but positive correlation between age and depression.

Table 7: Correlation of Fasting blood sugar vs. depression (PHQ score)

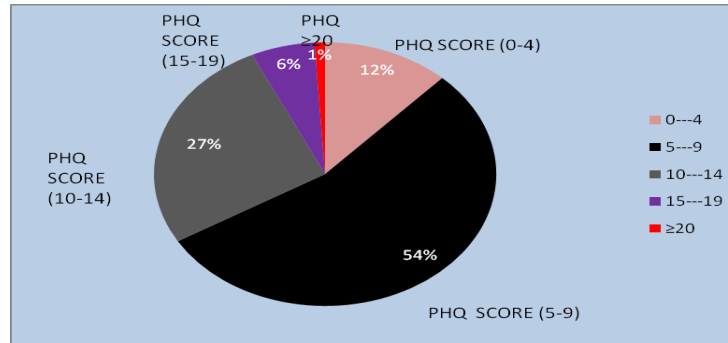
Number of subjects	Pearson r	95% confidence interval	P value (two-tailed)	R square
200	0.4497	0.3316 to 0.5539	< 0.0001	0.2022

Correlation co-efficient for fasting blood sugar vs. depression is 0.4497 and $p < 0.0001$.

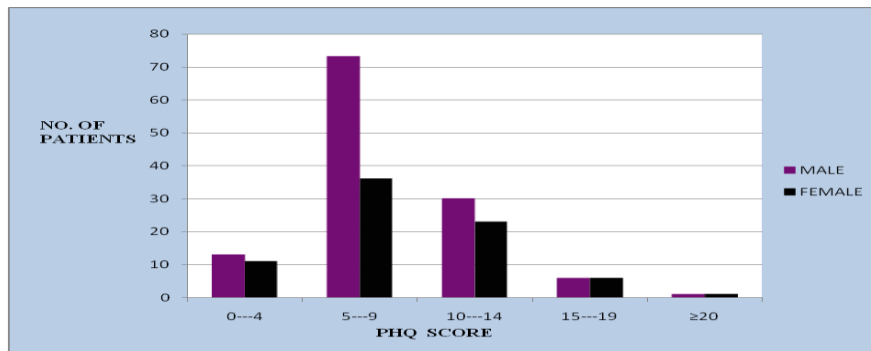
So it is a weak but a positive correlation between fasting blood sugar and depression score.



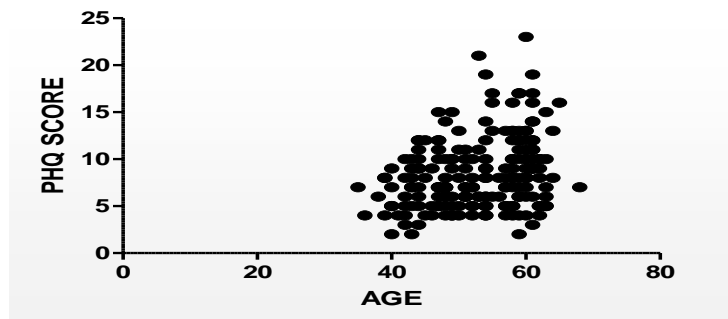
Graph (1): Number of patients in each age group



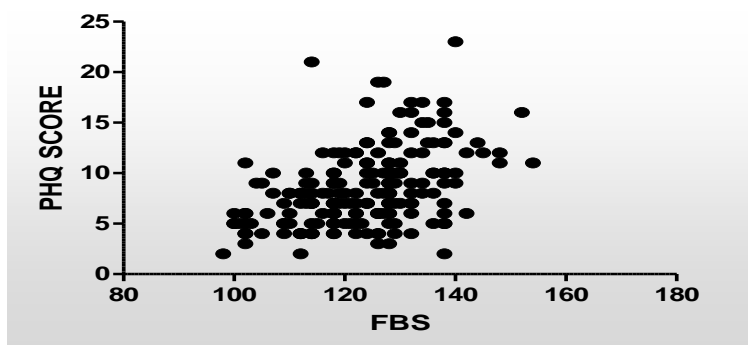
Graph: (2) Prevalence of depression in each group according to PHQ score



Graph (3): Males and females in each group of PHQ score



Graph (4): Correlation between age and PHQ score



Graph (5): Correlation between fasting blood sugar and PHQ score