Depression and anxiety as comorbid disorders in patients with Type II diabetes

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ABSTRACT

Background: India is on the verge of a potential epidemic for Type II diabetes with the second highest diabetic population in the world. Similarly, depression and anxiety are global mental health disorders of public health importance. **Objective:** The purpose of this study was to assess the relationship between comorbid anxiety and depression with patients of Type II diabetes mellitus in an urban metropolis. **Materials and Methods:** This research uses a cross-sectional study design with a sample of 100 consecutive male and female adult patients drawn from the study population of Type II diabetes mellitus patients. They were asked to complete the problem areas in diabetes scale (PAID), Patient health questionnaire-9, general anxiety disorder-7, and were clinically screened for depression. Patients' socioeconomic status and diabetes-related health-care utilization were also assessed. **Results:** The prevalence of depression and anxiety was 62% and 49%, respectively, while 39% of the subjects had comorbid anxiety and depression. There was a significant positive correlation between PAID scores and comorbid anxiety/depression ($\rho = 0.663$, $P < 0.001$), anxiety and body mass index ($\rho = 0.233$, $P = 0.02$), and physician visits and depression ($\rho = 0.294$, $P < 0.001$). The comparison between depressed ($n = 62$) and nondepressed ($n = 38$) groups revealed that depressed patients had greater diabetes care utilization. **Conclusions:** This study sheds light on the association between diabetes and mental health problems such as anxiety and depression among Indian patients visiting a government hospital setting. The high prevalence of anxiety and depression in our study suggests that every diabetic patient should be screened for depression and anxiety in routine clinical practice. The study adds to the increasing evidence pointing toward the bidirectional relationship between anxiety/depression and diabetes.

KEY WORDS: Diabetes; Anxiety; Depression; Type II Diabetes; Medical Comorbidity; Mental Health

INTRODUCTION

The incidence of diabetes mellitus is increasing worldwide in pandemic proportions.[1] Once considered as the "rich man's disease," research indicates that diabetes mellitus offers no socioeconomical discrimination as its burden rises both in the rich and the poor. Due to increasing urbanization and the changes in lifestyle that are associated with it, there has been a staggering rise in the incidence and prevalence of Type II diabetes mellitus.[2] Similar to patterns worldwide, India is on the verge of a potential epidemic for Type II diabetes and has the second highest diabetic population in the world with 69.2 million diagnosed diabetics.[3]

Several studies suggest that diagnosis and management of diabetes is a precursor for mental illnesses such as depression.[4] Furthermore, some studies have shown that this relationship might even be bidirectional with depression being identified as a risk factor for diabetes.[5] The cause and effect relationship of these two disorders is ambiguous but

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research indicates that coexisting depression needs to be detected and treated to prevent worse outcomes in diabetic patients.[6] In recent years, depressive disorders have become the major focus of clinicians and any depression with diabetes is usually missed as more attention is paid to the chronic medical disease while depression usually goes unrecognized and undertreated.[7]

In the case of diabetes, both depression and anxiety are often grouped together and have been implicated as having a negative impact on the disease.[8] There is still a dearth of literature on anxiety and the impairment of diabetic patients associated with it, but the occurrence of anxiety is associated with severity of illness, treatment failure, higher levels of recurrence, chronicity, increased risk for suicide, and greater utilization of medical resources.[9] In addition, research suggests that a substantial amount of anxiety disorders occur independently of major depression in diabetic patients and that both disorders have equal statistically significant association with role impairment.[10] Although it is quite clear that both depression and diabetes are major health-care problems in India, surprisingly limited research has been conducted to study the comorbidity of these conditions in the Indian scenario.[11] This study is a cross-sectional exploratory study to investigate the prevalence and relationship of depression and anxiety with Type II diabetes mellitus in Indian adults. The study also aimed at studying differences between patients' diabetes with and without depression.

MATERIALS AND METHODS

This research is a cross-sectional study design in a sample of 100 consecutive patients with clinically diagnosed Type II diabetes mellitus attending the diabetes outpatient department of a tertiary care government hospital in an urban metropolis. The study was approved by the institutional ethics committee. All patients were informed about the details of the study, and a valid written informed consent was obtained before the study. The inclusion criteria for the study were age between 18 and 60 years, both genders and a diagnosis of Type II diabetes mellitus since at least 1 year before the study. Only patients with detailed health records including recent blood glucose readings taken within the last 6 months were selected for the study.

All patients were first assessed with a semi-structured pro forma to collect sociodemographic data and details of diabetes. The details of the diabetes included duration of the condition, type of treatment being received, body mass index (BMI), waist circumference, health-care utilization, and complications if any due to diabetes. The level of diabetes control was assessed using fasting and post lunch blood sugar levels of the last 6 months. The blood sugar values on the day of the administration of the test were labeled as baseline values, while the average blood sugar values were also calculated over the last 6 months. The patients were then asked to complete the problem areas in diabetes scale (PAID)[12] followed by the Patient health questionnaire-9[13] and generalized anxiety disorder scale (GAD-7).[14] Kuppuswamy analysis was conducted to assess their socioeconomic status (SES).[15] The scales were administered in the languages that they best understood, i.e., English, Hindi, or Marathi. Health-care utilization was calculated by assessing the number of visits to a health professional in the last 6 months. The number of visits to the hospital, as well as visits to any other health professional, was noted. The cost of treatment incurred was calculated as the cost incurred during the baseline visit including hospital consultation charges, the cost borne by the hospital for the dispensed medications, and patient's transportation charges.

Analysis of the data was conducted using the SPSS 19.0 software. Chi-square test, student *t*-tests, and Spearman's Rho (ρ) were used where appropriate. In between group differences were calculated for depressed and nondepressed subjects. A $P < 0.05$ was considered significant for all statistical analysis.

RESULTS

Sociodemographic Profile

This study included 100 patients with Type II diabetes visiting the diabetes outpatient department of a tertiary care government hospital. The mean age of the study subjects was 50.3 ± 7.91 years. The mean duration of illness was 6.2 ± 4.34 years. The study sample comprised 63 females and 37 males. 24 subjects were found to be hypertensive. The data show that most patients were from a low SES. On calculating, the mean Kuppuswamy score for analyzing SES the 100 patients, we found a score of 9.08 classifying them in the higher side of the low SES (Table 1).

Prevalence of Depression and Anxiety

The prevalence of depression and anxiety was found to be 62% ($n = 62$) and 49% ($n = 49$), respectively. In this sample, 39% ($n = 39$) had comorbid anxiety and depression. There was a significant positive correlation between depression and anxiety ($\rho = 0.628$, $P < 0.001$). There was a significant positive correlation between PAID score ($\rho = 0.663$, $P < 0.001$), anxiety and depression ($\rho = 0.628$, $P < 0.001$), and SES ($\rho = -0.274$, $P = 0.006$). In addition, 38% ($n = 38$) reported diabetic complications. 26 patients with depression had diabetic complications ($\chi^2 = 0.68$, $P = 0.41$). An equal number of patients with and without anxiety had diabetic complications ($\chi^2 = 0.6$, $P = 0.44$) (Table 2).

Correlation Findings

Correlation studies showed that there was a positive significant correlation between anxiety and BMI ($\rho = 0.233$, $P = 0.02$)

Table 1: Prevalence of depression and anxiety in the sample

Parameter	*n*=100
Depression screening PHQ-9 scores	
Score≥10 (depressed)	62
Score≤10 (not depressed)	38
Minimal (score 0-4)	16
Mild (score 5-9)	22
Moderate (score 10-14)	24
Moderately severe (score 15-19)	23
Severe (score 20-27)	15
Anxiety status GAD-7 scores	
GAD≥10 (anxious)	49
GAD≤10 (not anxious)	51
Minimal (score 0-4)	13
Mild (score 5-9)	38
Moderate (score 10-14)	32
Severe (score 15-21)	17

(N and percentage same as the total number of subjects=100),
PHQ: Patient health questionnaire, GAD: Generalized anxiety disorder

Table 2: Prevalence of depression, anxiety, and diabetes related complications

Parameters	Complications present	Complications absent	Statistical analysis
Depression present	26	36	$\chi^2=0.68$, $P=0.41$ NS
Depression absent	12	26	
Anxiety present	21	28	$\chi^2=0.6$, $P=0.44$ NS
Anxiety absent	17	34	

NS: Not significant, Chi-square test used in the statistical analysis

while no such correlation existed between depression and BMI ($\rho = 0.182$, $P = 0.7$). Furthermore, no correlation was found between waist circumference and depression ($\rho = 0.149$, $P = 0.138$) or waist circumference and anxiety ($\rho = 0.192$, $P = 0.056$). There was a significant positive correlation between number of visits to any doctor and depression ($\rho = 0.294$, $P < 0.001$). The between group differences were studied between the groups divided based on their depression status (depressed and nondepressed) (Table 3).

DISCUSSION

The findings of our research are consistent with other studies in the literature concluding that diabetics were more likely to have depression and anxiety within 6 months before their diabetes diagnosis.[16] This study found that the prevalence of depression and anxiety in the study sample was a whopping 62% and 49%, respectively, and the prevalence of comorbid

Table 3: Depression in relation to various parameters of diabetes

Parameters	Depression status	Mean±standard deviation (*n*=100)	*P*
BMI	Depressed	26.14±5.18	0.024*
	Not depressed	23.88±4.01	
Waist circumference	Depressed	96.56±11.23	0.07 NS
	Not depressed	91.97±13.61	
Number of visits to J.J Hospital	Depressed	5.89±2.26	0.262 NS
	Not depressed	5.63±2.48	
Number of visits to other doctor	Depressed	1.82±2.00	0.022*
	Not depressed	0.89±1.52	
Cost incurred	Depressed	88.69±145.23	0.732
	Not depressed	77.88±97.26	
Kuppuswamy score	Depressed	7.87±4.19	0.002*
	Not depressed	11.05±5.64	
PAID score	Depressed	39.64±16.3	< 0.001*
	Not depressed	22.34±13.06	
FBS (average)#	Depressed	164.95±59.66	0.594
	Not depressed	157.90±50.17	
PPBS (average)#	Depressed	231.60±75.41	0.574
	Not depressed	221.55±75.92	

*Significant ($P<0.05$). Unpaired *t*-test used in the assessment,
NS: Not significant, PAID: Problem areas in diabetes,
BMI: Body mass index

anxiety and depression was found to be 39%. These findings are in keeping with other studies conducted in Asian countries and India.[17,18] Another key finding of this study was that anxiety has a statistically significant correlation with BMI and diabetes-related emotional distress indicated by PAID scores.

The patients with higher depression scores were found to have greater health-care utilization in terms of diabetes related costs and visitation.[19] In this study, it was found that depression and anxiety has a significant relationship with diabetes and most of its outcomes, and hence, it is recommended that every diabetic patient should be screened for the same in routine clinical practice. A positive correlation was found between emotional distress and anxiety. The close relationship between PAID scores and GAD-7 scores seem to be due to the similar items present in both the scales. Furthermore, there was a significant correlation between PAID scores and depression. This finding helped corroborate the evidence in the literature pointing toward psychosocial factors specific to diabetes.[20] Depression is usually marked by pessimistic thoughts, low self-esteem, and feelings of inadequacy hence diabetic patients with depression might be more likely to feel overwhelmed by their diabetes and

related challenges.[21] Indeed, this was reflected in the group differences between diabetics who were depressed versus those who were not depressed. Thus, we can conclude that diabetics with high depression scores are more likely to perceive greater problems due to their diabetic illness.[22] A positive correlation was found between baseline post prandial blood sugars and PAID scores. This might indicate that emotional distress associated with diabetes may be affecting the control of blood sugar. These findings echo the literature on increased emotional distress (assessed by PAID scale) as a significant predictor of poor glucose control in patients of Type II diabetes.[23,24] This research identified 38% of the sample to have some diabetes-induced complication such as heart disease and stroke, diabetic foot, diabetic nephropathy, and eye related sequelae. However, there was no significant relationship between anxiety and depression and diabetes complications. Thus, the study findings are in contrast some of the previously conducted studies in the literature showing that diabetics with comorbid depression generally have higher chances of developing more advanced and severe complications from the disease.[25,26]

The findings of this study should be viewed in the light of some limitations. The study sample was very sample in view of the prevalence of diabetes in India, and the study findings cannot be generalized. No power analysis was performed to calculate a viable sample size. The psychiatric diagnosis was based on a small screening instrument rather than a clinical diagnostic interview and post lunch and fasting blood sugar instead of glycosylated hemoglobin was a measure for diabetic control. This was in keeping with certain time and financial constraints.

Although we did not find any correlation between comorbid anxiety and depression and glycemic control, a statistically significant relationship was found between PAID scores and poor glycemic control. PAID scores and comorbid depression and anxiety were also positively correlated with each other indicating that it is worthwhile to conduct further research to pinpoint whether it is the depression, anxiety or the diabetes related emotional distress that is worsening the glycemic control. A longitudinal study of depression, anxiety, and diabetes outcomes with all the various parameters of glycemic control including glycosylated hemoglobin will also help in establishing causal associations. The high prevalence of psychiatric illness in this study suggests that every diabetic patient needs to be screened for depression and anxiety. In addition, the statistically significant relationship between anxiety and BMI as well as a significant positive correlation of depression with diabetes care utilization suggests that proper counseling on the various problems encountered in diabetes can help improve the PAID scores and consequently glycemic control. Early psychological assessment and treatment can help in lowering the financial and emotional burden on patients as well as the burden on the health-care system.

CONCLUSIONS

This study sheds light on the association between diabetes and mental health problems such as anxiety and depression among Indian patients visiting a government hospital setting. The high prevalence of anxiety and depression in our study suggests that every diabetic patient should be screened for depression and anxiety in routine clinical practice. The study adds to the increasing evidence pointing toward the bidirectional relationship between anxiety/depression and diabetes.

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