Depression and diabetes: An experience from Kashmir

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ABSTRACT

Background: Diabetes mellitus is a common chronic metabolic disorder characterized by hyperglycemia. Minimal attention has been paid toward the relationship between diabetes and depression in developing countries such as India, despite a number of studies in developed countries, exploring casual pathway between the two highly prevalent conditions. The aim of this study was to estimate the prevalence and severity of depression among patients of diabetes attending the endocrinology department of a tertiary care hospital of Kashmir.

Methodology: A total of 527 patients having diabetes of ≥6 months with age ranging from 18 years to 60 years were screened for major depressive disorder (MDD) using Diagnostic and Statistical Manual IV-based criteria. Severity of depression was assessed by the Montgomery–Asberg Depression Rating Scale.

Results: Depression was present in 39.65% of patients. Depression was more prevalent in the age group of 29–38 years, in females as compared to males, among literates and government employees. Prevalence of depression among Type 1 diabetic patients was 60%, while as in case of Type 2, it was 37.75%. Depressed patients had higher fasting blood glucose levels as compared to nondepressed diabetic patients.

Conclusion: MDD is inordinately high among adult diabetic patients, and majority of the depressive patients have moderate intensity of MDD.

Key words: Depression, diabetes, Kashmir, tertiary

INTRODUCTION

Diabetes mellitus is a syndrome with disordered metabolism and inappropriate hyperglycemia due to either the deficiency of insulin secretion or to a combination of insulin resistance and inadequate insulin secretion to compensate.¹ It is a progressive metabolic disorder affecting every aspect of the patient’s life – physical and mental well-being, and no modality of treatment can give dramatic results or halt the progression of the disease.²

In 2000, India topped the list with highest number of diabetics (31.7 million) in the world, the number rose to 62.4 million in 2011 and is expected to reach 69.9 million by 2025.³,⁴ High prevalence in India is attributed to rapid urbanization and economic development. Indians are more prone for diabetes because of low body mass index, but...
with high upper body adiposity, high body fat percentage, and high levels of insulin resistance.[9]

Recognition of psychiatric aspects of diabetes goes back to the 17th century when Dr. Thomas Willis, a British physician wrote of diabetes mellitus “sadness or long sorrow as likewise convulsions and other depressions and disorders of animal spirits are used to generate or foment this morbid disposition.”[10] Studies have found increased the prevalence of depression among Type 1 and Type 2 DM patients.[7,9] Evidence suggests a bidirectional relationship between depression and Type 2 diabetes.[9] In addition to depression being a consequence of diabetes, depression may also be a risk factor for the onset of diabetes.[11] Depression in diabetes is associated with poor compliance to diabetic treatment, poor glycemic control, and an increased risk of micro and macrovascular complications.[12] It is also associated with decreased glucose tolerance, enhanced insulin secretion, and diminished insulin sensitivity on glucose tolerance test associated insulin resistance.[13]

An accurate estimate of depression prevalence is needed to keep and gauge the potential impact of depression management in patients with comorbid diabetes. Better recognition and treatment of depression is important in themselves but could also improve medical outcome by substantial portion in patients of diabetes. Our study was undertaken to find the relationship between depression and diabetes. It also aimed to study the severity of depression in diabetics.

**METHODOLOGY**

This cross-sectional study was undertaken in the Department of Endocrinology, Sher-e-Kashmir Institute of Medical Sciences, Srinagar, which is a tertiary care center providing specialist services to the whole of diabetic population of Kashmir valley. It was a time bound study for 2 years and was approved by the Institute Ethical Committee. Patients with diabetes of minimum 6-month duration, in the age group of 18–60 years, were included in the study. A prior informed consent was taken for inclusion in the study, and patients were explained about the purpose of the study. Patients having complications of diabetes (acute or chronic), having any axis I psychiatric diagnosis prior to diabetes, having uncontrolled hypertension, ischemic heart disease, rheumatoid arthritis, malignancy, asthma or stroke, were excluded from the study.

A total of 527 patients met the eligibility criteria and were screened for major depressive disorder (MDD) using the Diagnostic and Statistical Manual IV (DSM IV)-based criteria system, which is sensitive and valid method for detecting depression in diabetics.[14] Montgomery–Asberg Depression Rating Scale (MADRS) and clinical global impression scales were used to assess the severity of MDD after it was established by DSM IV criteria.[15,16]

**Statistical analysis**

Patients were grouped according to age, sex, marital status, occupation, family status, literacy, and intra-group difference between prevalences of depression were evaluated using Chi-square analysis with Yates’s correction wherever necessary. Student’s t-test in addition to Chi-square analysis was used to evaluate differences between various means. Data were analyzed using SPSS, version 20 (Armonk, NY: IBM Corp).

**RESULTS**

Age of patients ranged from 19 to 60 years with a mean age of 47.66 years. The prevalence of MDD in males was 34.01%, and in females was 41.84%, the difference is statistically insignificant. Unmarried patients had highest prevalence of MDD, least in widowers, and the difference was statistically significant. There were seven postgraduates in our study, in whom the prevalence of MDD was 71.42% (5), whereas in illiterates, which formed the predominant group, the prevalence was 35.54% (150) [Table 1].

**Diabetes-related observations**

As majority of the patient population belonged to Type 2 diabetes; hence, the maximum number of patients were on oral hypoglycemic agents (OHAs), that is, 80.83% (n = 426) and 10.62% (n = 56) had both OHAs as well as insulin in

| Table 1: Sociodemographic factors |
|----------------------------------|
| Characteristics | Variables | Frequency | MDD (%) | \( \chi^2 \) | \( P \) |
|-----------------|-----------|-----------|----------|-----------|---------|
| Age (years)     | 19-28     | 20        | 10 (50)  | 4         | <0.01   |
|                 | 29-38     | 33        | 19 (57.57)|           |         |
|                 | 39-48     | 134       | 70 (52.23)|           |         |
|                 | 49-58     | 296       | 100 (33.78)|           |         |
|                 | >58       | 44        | 10 (22.72)|           |         |
| Sex             | Male      | 147       | 50 (34.01)| 1         | >0.15   |
|                 | Female    | 380       | 159 (41.84)|           |         |
| Marital status  | Married   | 427       | 181 (42.38)| 10.54     | <0.05   |
|                 | Unmarried | 22        | 10 (45.45)|           |         |
|                 | Divorced  | 6         | 2 (33.33)|           |         |
|                 | Widower   | 72        | 16 (22.22)|           |         |
| Education       | Illiterate| 422       | 150 (35.54)| 2         | <0.001  |
|                 | Undergraduate | 58   | 28 (48.27)|           |         |
|                 | Graduate  | 40        | 26 (65)  |           |         |
|                 | Postgraduate | 7    | 5 (71.42)|           |         |
| Occupation      | Government employee | 89  | 63 (70.78)| 3         | <0.001  |
|                 | Homemakers | 356   | 124 (34.3)|           |         |
|                 | Business  | 66        | 14 (21.21)|           |         |
|                 | Students  | 16        | 8 (50)   |           |         |

MDD – Major depressive disorder

| Table 2: Diabetic regimen |
|--------------------------|
| Regimen                  | Number of patients (%) |
| Oral hypoglycemic agents | 426 (80.83)            |
| Oral hypoglycemic agents and insulin | 56 (10.62)            |
| Insulin                  | 45 (8.50)              |
| Diet control             | 0                     |
their regimen [Table 2]. The mean duration of diabetes was 6.6 ± 2.6 years in Type 2 depressed and 4.26 ± 2.72 years in Type 2 nondepressed, the difference was statistically significant (P < 0.01), whereas as in Type 1, duration was 5.7 ± 2.02 years in depressed and 4 ± 1.87 years in nondepressed patients [Table 3].

**Association between diabetes and depression**

The mean prevalence of MDD in our study was 39.65%. In Type 1 diabetics, MDD prevalence was 60%, whereas in Type 2, it was 37.75%; the difference is statically significant (P < 0.01). MADRS scores in both types of diabetics were of moderate severity [Table 4].

**DISCUSSION**

Depression may have special clinic relevance in diabetes through its association with poor glycemic control and reduced the quality of life.[17,18] Being a common comorbid condition in people with diabetes, it has been associated with higher hemoglobin A1c levels, higher incidence of diabetes-related complications, and higher mortality rates.[19]

**Sociodemographic factors**

Our study was done on 527 patients of diabetes, which include Type 1 (45) and Type 2 (482). The mean age of our cases was 47.66 years with a maximum prevalence of depression in the age group of 29–38 years, having a prevalence rate of 57.57% followed by the age group of 39–48 years, which had a prevalence rate of 52.23%. There were 27.89% males (147) as compared to 72.11% females (380), and there was no statistical difference regarding sex difference as found by Popkin et al.[19] There was a statistically significant difference (χ² = 10.54; P = 0.05) between various marital status with highest prevalence of depression in unmarried group (45.45%) and least in widows/widowers (22.2%), perhaps strong pointer toward role of biological factors in the development of depression in diabetes as compared to only psychological factors. MDD was highly prevalent in literate class, and among them, postgraduates had highest prevalence (71.42%), which was statistically significant (P < 0.001). Government employees had significantly higher rates of depression (70.78%) followed by students (50%), thus the prevalence of depression did not correlate with employment, again highlighting our earlier observation of biological factors playing more role in the development of depression in diabetes. Further, the need to function at higher levels of cognition does play a role in the development of depression, as is evident by higher rates of depression in postgraduates, government employees, and students.

**Diabetes- and depression-related factors**

In our study, Type 2 diabetes mellitus patients were in majority (91.46%) due to higher prevalence of Type 2 diabetes as compared to Type 1 diabetes mellitus patients in the community.

Patients of Type 1 and 2 diabetes with MDDs differed significantly from Type 1 to 2 diabetics without depression on the basis of mean duration of diabetes. The mean duration of diabetes in Type 1 diabetes mellitus depressed patients and Type 2 diabetes mellitus depressed was 5.7 ± 2.03 years and 6.6 ± 2.60 years, respectively. For patients with Type 1 diabetes mellitus without depression and Type 2 diabetes mellitus without depression, the mean duration of diabetes mellitus was 4.00 ± 1.87 years and 4.26 ± 2.72 years, respectively. This difference in mean durations was statistically significant. This does not confer to what has been reported by Robinson et al., who found no relation between current psychiatric state and duration of diabetes.[20] Further studies may be needed to confirm or disapprove this association.

In our study, mean blood glucose (fasting) was 204 ± 18.01 mg/dl and 103.5 ± 17.37 mg/dl in Type 1 depressed and nondepressed cases, respectively, and the difference was statistically highly significant (P < 0.001). Type 2 depressed diabetics had a mean blood glucose fasting of 182.95 ± 47.5 mg/dl, and type 2 nondepressed patients had a mean fasting blood glucose of 119.02 ± 53.51 mg/dl, and this difference was also statistically highly significant (P < 0.001). This goes in conformity with de Groot et al., who reported that type 1 diabetes patients with lifetime history of major depression had poorer fasting

![Table 3: Relation of depression with fasting blood glucose level and duration of diabetes](image)

![Table 4: Prevalence and severity of major depressive disorder in patients](image)

*Chi square test, **t-test. MDD – Major depressive disorder; MADRS – Montgomery–Asberg Depression Rating Scale; CGI – Clinical Global Impression; SD – Standard deviation*
The prevalence of MDD in diabetics in our study was 39.65%, which is much higher than community prevalence (2% to 19%) and is consistent with prevalence of depression found by various researchers in diabetics such as Peyrot and Rubin (41.3%) and Black SA (31.1%) but lower than that found by Khamseh et al. (71.8%).[23-25] Another study from India on patients with type 2 diabetes reported 23% of patients meeting the criteria for major depression whereas 18% qualifying for moderate depression.[26] The prevalence of depression in type 1 diabetics in our study was 60%, and type 2 diabetics was 37.75%; this difference was statistically significant (P < 0.001) although this result might have been affected by much lower number of type 1 diabetics (45) in contrast to type 2 diabetics (482). Even though the majority of studies did not report the depression prevalence separately by type of diabetes, Pouwer et al. have also reported greater prevalence of depressive affect among type 1 than type 2 patients with diabetes.[27] Our study goes against the study by Engum et al., who reported Type 2 to be more depressed than type 1 diabetics (15.2% vs. 19%).[28] The prevalence of depression (39.65%) in our study in comparison to other debilitating disorders such as cancer (16-5%), coronary heart disease prevalence (15%-30%), and stroke (30%) suggests the strong association between diabetes and depression.[29-31]

CONCLUSION

Findings of our study echo the observation first made by Willis in 17th Century that depression is associated with diabetes.[6] The complex interaction of physical, psychological, and genetic factors that contribute to this association remains uncertain. Depression may occur secondary to the hardships of advancing diabetes or to diabetes-related abnormalities of neuroendocrine or neurotransmitter functions.[32] Majority of patients with diabetes, who have MDD, have of moderate severity and not just mild depressive symptomatology. MDD in diabetes is significantly associated with poorly controlled fasting blood sugar levels, and this may be relevant clinically to improve glycemic control, prevent complications, and improve quality of life.[33] This is particularly relevant in India where diabetes has been escalating. Initiatives such as Dialogue on Diabetes and Depression founded by a Geneva-based organization, so as to address the comorbidity of depression and diabetes is also needed in our country.[34]

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Conflicts of interest
There are no conflicts of interest.

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