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Prevalence of Depression and Anxiety Among Patients with Type 2 Diabetes Mellitus and Their Association with Glycaemic Control.

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Abstract

Background: Type 2 diabetes mellitus is a chronic metabolic disorder associated with several physical and psychological complications. Depression and anxiety are frequently observed among individuals with diabetes and may adversely affect medication adherence, lifestyle modification and glycaemic control. Early identification of psychiatric comorbidities is important for comprehensive diabetes management. Aim: To determine the prevalence of depression and anxiety among patients with type 2 diabetes mellitus and evaluate their association with glycaemic control. ***Materials and Methods***: A hospital-based cross-sectional observational study is proposed among 150 patients diagnosed with type 2 diabetes mellitus attending the General Medicine outpatient and inpatient departments of a tertiary care hospital. Sociodemographic and clinical information will be collected using a structured questionnaire. Depression and anxiety will be assessed using the Hospital Anxiety and Depression Scale (HADS). Glycaemic control will be evaluated using glycated haemoglobin (HbA1c). The association between psychiatric symptoms and glycaemic control will be analysed using appropriate statistical tests. ***Results***: The primary outcomes will include the prevalence of depression and anxiety and their relationship with HbA1c levels. Comparisons will be made between patients with adequate and inadequate glycaemic control. The results will also assess the association between psychiatric symptoms, duration of diabetes and sociodemographic characteristics. ***Conclusion***: Screening for depression and anxiety may be valuable in patients with type 2 diabetes mellitus. Identification and appropriate management of psychiatric comorbidities may improve psychological well-being, treatment adherence and overall diabetes management.

Keywords: Type 2 diabetes mellitus, depression, anxiety, HbA1c, glycaemic control, psychiatric morbidity, HADS.

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and progressive impairment of pancreatic beta-cell function, resulting in persistent hyperglycaemia. It is a major public health concern worldwide and is associated with several microvascular and macrovascular complications, including diabetic retinopathy, nephropathy, neuropathy, cardiovascular disease and cerebrovascular disorders. Apart from its physical complications, diabetes mellitus is also associated with significant psychological and emotional disturbances, particularly depression and anxiety [1].

Depression is one of the most frequently reported psychiatric comorbidities among individuals with diabetes mellitus. The continuous demands of disease management, dietary restrictions, medication adherence, regular monitoring of blood glucose and fear of long-term complications may contribute to psychological distress. Individuals with diabetes may experience persistent sadness, reduced interest in daily activities, fatigue, sleep disturbances, impaired concentration and feelings of hopelessness. These symptoms can negatively influence self-care behaviour and treatment adherence [2].

Several studies have demonstrated a bidirectional relationship between diabetes mellitus and depression. Individuals with depression may have an increased risk of developing type 2 diabetes because of behavioural, neuroendocrine and metabolic mechanisms. Similarly, individuals with diabetes have an increased likelihood of experiencing depressive symptoms compared with those without diabetes [2,3]. Chronic inflammation, activation of the hypothalamic-pituitary-adrenal axis, oxidative stress and changes in neurotransmitter function have been proposed as possible biological mechanisms underlying this association.

Anxiety is another important psychological condition frequently encountered in patients with diabetes. Fear of hypoglycaemia, uncertainty regarding disease progression, financial burden and concerns about developing complications may contribute to anxiety symptoms. Diabetes-related emotional distress may also interfere with effective self-management and adversely affect quality of life [4]. Glycaemic control is an important determinant of long-term outcomes in diabetes mellitus. Glycated haemoglobin (HbA1c) provides an estimate of average blood glucose levels over approximately two to three months and is widely used to assess diabetes management. Poor glycaemic control has been associated with an increased risk of diabetes-related complications. Psychological disorders may contribute to inadequate glycaemic control through reduced medication adherence, unhealthy dietary patterns, physical inactivity and impaired motivation for self-care [1,5].

The Hospital Anxiety and Depression Scale (HADS) is a commonly used screening instrument for identifying symptoms of anxiety and depression in patients with physical illnesses. It contains separate anxiety and depression subscales and minimizes the influence of physical symptoms that may overlap with medical conditions [6]. In India, where the prevalence of type 2 diabetes mellitus is substantial, understanding the psychological burden associated with the disease is particularly important. Despite advances in diabetes management, psychiatric comorbidities may remain underdiagnosed in general medical settings.

Therefore, the present study aims to determine the prevalence of depression and anxiety among patients with type 2 diabetes mellitus and investigate their association with glycaemic control as measured by HbA1c. The findings may help emphasize the importance of integrating psychological assessment into routine diabetes care.

Aim: To determine the prevalence of depression and anxiety among patients with type 2 diabetes mellitus and evaluate their association with glycaemic control.

MATERIALS AND METHODS

A hospital-based cross-sectional observational study will be conducted in the Departments of General Medicine and Psychiatry at a tertiary care teaching hospital.

Study duration

The proposed study duration will be six months after obtaining Institutional Ethics Committee approval.

Study population

The study will include 150 patients diagnosed with type 2 diabetes mellitus attending the General Medicine outpatient department and inpatient wards.

Inclusion criteria

- Patients diagnosed with type 2 diabetes mellitus according to established diagnostic criteria.
- Age between 30 and 70 years.
- Duration of diabetes of at least six months.
- Patients willing to participate and provide written informed consent.

Exclusion criteria

- Patients with previously diagnosed major psychiatric disorders currently requiring intensive psychiatric treatment.
- Patients with severe cognitive impairment.
- Patients with acute medical emergencies.
- Patients with severe systemic illness affecting their ability to participate.
- Patients unwilling to provide informed consent.

Previously diagnosed depression or anxiety should be documented rather than automatically excluded if the research objective is to estimate the overall burden of these conditions.

Data collection

Sociodemographic and clinical details will be collected using a structured questionnaire. Information regarding age, sex, education, occupation, socioeconomic status, marital status, duration of diabetes, treatment modality, comorbidities and family history will be recorded.

A detailed clinical history and general physical examination will be performed. Particular attention will be given to the presence of diabetes-related complications, including neuropathy, retinopathy, nephropathy and cardiovascular disease.

Assessment of depression and anxiety

Psychiatric symptoms will be assessed using the Hospital Anxiety and Depression Scale (HADS), developed by Zigmond and Snaith [6].

The questionnaire consists of 14 items divided into two subscales:

- HADS-Anxiety (HADS-A): Seven questions assessing anxiety symptoms.
- HADS-Depression (HADS-D): Seven questions assessing depressive symptoms.

Each subscale has a maximum score of 21.
The interpretation will be:

Score	Interpretation
0–7	Normal
8–10	Borderline abnormal
11–21	Abnormal

A score of 8 or above may be used to identify possible anxiety or depressive symptoms for screening purposes. A positive screening result is not equivalent to a formal psychiatric diagnosis and should be followed by clinical assessment where indicated.

Assessment of glycaemic control

Glycaemic control will be evaluated using HbA1c measured through a standardized laboratory method. For descriptive analysis, participants may be classified into the following categories:

- Good glycaemic control: HbA1c below 7%.
- Intermediate control: HbA1c 7–8%.
- Poor glycaemic control: HbA1c above 8%.

These are operational study categories; individualized treatment targets may differ according to clinical circumstances.

Statistical analysis

Data will be entered into Microsoft Excel and analysed using SPSS or equivalent statistical software. Continuous variables will be expressed as mean ± standard deviation, while categorical variables will be expressed as frequencies and percentages.
The chi-square test will be used to evaluate associations between categorical variables. Independent Student's t-test or Mann–Whitney U test will be used for continuous variables, depending on distribution. Logistic regression may be performed to determine whether depression and anxiety are independently associated with poor glycaemic control after adjustment for potential confounders.
A p-value below 0.05 will be considered statistically significant.

RESULTS

Table 1. Sociodemographic characteristics

Parameter	Number	Percentage
Male	84	56.0%
Female	66	44.0%
Age 30–40 years	24	16.0%
Age 41–50 years	45	30.0%
Age 51–60 years	51	34.0%
Age 61–70 years	30	20.0%
Urban residence	96	64.0%
Rural residence	54	36.0%

The study population consisted of 150 patients with type 2 diabetes mellitus. Males constituted 56% of participants, while females constituted 44%. The largest age group was 51–60 years (34%).

Table 2. Prevalence of depression and anxiety according to HADS

Assessment	Score category	Number	Percentage
Depression	Normal (0–7)	90	60.0%
	Borderline (8–10)	36	24.0%
	Abnormal (11–21)	24	16.0%
Anxiety	Normal (0–7)	75	50.0%
	Borderline (8–10)	42	28.0%
	Abnormal (11–21)	33	22.0%

Depressive symptoms were identified in 40% of participants using HADS scores of 8 or above. Anxiety symptoms were identified in 50%. Anxiety symptoms were more frequent than depressive symptoms in this illustrative population.

Table 3. Association between depression and glycaemic control

HbA1c category	No depression	Positive depression screen	Total
Below 7%	28	7	35
7–8%	31	19	50
Above 8%	31	34	65
Total	90	60	150

Illustrative chi-square test: $\chi^2 = 17.02$; df = 2; p = 0.0002.

The proportion of participants screening positive for depression increased with HbA1c category. Depression screening positivity was 20% in participants with HbA1c below 7%, compared with 52.3% among those with HbA1c above 8%. This suggests an association between depressive symptoms and poor glycaemic control.

Table 4. Association between anxiety and glycaemic control

HbA1c category	No anxiety	Positive anxiety screen	Total
Below 7%	25	10	35
7–8%	28	22	50
Above 8%	22	43	65
Total	75	75	150

Illustrative chi-square test: $\chi^2 = 20.55$; df = 2; p = 0.00003.

Anxiety screening positivity increased from 28.6% among patients with HbA1c below 7% to 66.2% among patients with HbA1c above 8%. This indicates a possible association between anxiety symptoms and poor glycaemic control.

Table 5. Association between duration of diabetes and psychiatric morbidity

Duration of diabetes	Participants	Depression positive	Anxiety positive
Less than 5 years	45	12 (26.7%)	16 (35.6%)
5–10 years	60	25 (41.7%)	30 (50.0%)
More than 10 years	45	23 (51.1%)	29 (64.4%)
Total	150	60 (40%)	75 (50%)

Participants with diabetes duration exceeding 10 years demonstrated a higher prevalence of depressive and anxiety symptoms than those with shorter disease duration. This may reflect the cumulative psychological burden of living with a chronic illness.

Table 6. Multivariable analysis of factors associated with poor glycaemic control

Variable	Adjusted OR	95% CI	p-value
Positive depression screen	2.10	1.05–4.20	0.036
Positive anxiety screen	2.35	1.15–4.80	0.019
Diabetes duration over 10 years	1.85	0.90–3.80	0.094
BMI ≥25 kg/m²	1.55	0.78–3.10	0.210
Poor medication adherence	2.75	1.30–5.80	0.008

DISCUSSION

Type 2 diabetes mellitus is a chronic metabolic condition that requires continuous treatment, regular monitoring and lifestyle modifications. The psychological burden associated with diabetes is increasingly recognized as an important factor influencing treatment outcomes. Depression and anxiety may interfere with disease self-management and contribute to poor glycaemic control.

The present study is designed to investigate the prevalence of depression and anxiety among patients with type 2 diabetes mellitus and their relationship with HbA1c levels. The use of HADS provides a standardized approach to screening for anxiety and depressive symptoms among individuals attending general medical services [6].

Previous research has demonstrated a substantial burden of depression among individuals with type 2 diabetes. A systematic review and meta-analysis conducted in India by Hussain et al. reported a pooled depression prevalence of approximately 38%, although considerable variation existed between the included studies [7]. Differences in study populations, diagnostic instruments and clinical settings may explain variations in reported prevalence.

The association between depression and glycaemic control is particularly important. Depression may influence glycaemic outcomes through reduced motivation, poor medication adherence, unhealthy dietary habits and decreased physical activity. A recent systematic review and meta-analysis by Narra et al. reported higher mean HbA1c levels among individuals with diabetes and depression compared with those without depression, although the magnitude and certainty of the association require careful interpretation [8].

Anxiety may also contribute to difficulties in diabetes management. Fear of hypoglycaemia, concerns regarding long-term complications and uncertainty about disease progression may increase psychological distress. Diabetes-related distress and clinical anxiety should be distinguished because they are related but separate constructs. The bidirectional relationship between diabetes and depression is supported by several proposed biological mechanisms. Chronic hyperglycaemia, systemic inflammation, oxidative stress and dysregulation of the hypothalamic-pituitary-adrenal axis may contribute to both metabolic and psychological disturbances [2,3]. Conversely, depression may lead to behavioural changes that negatively affect glycaemic control.

An important implication of this research is the potential value of integrating psychiatric screening into routine diabetes services. General Medicine departments can use standardized screening instruments to identify individuals who may benefit from further psychiatric assessment. Early recognition, counselling and appropriate treatment may improve quality of life and support better adherence to diabetes treatment.

However, the proposed cross-sectional design has limitations. It cannot establish whether depression or anxiety causes poor glycaemic control or develops as a consequence of chronic diabetes and its complications. Other variables, including socioeconomic status, medication adherence, obesity, diabetes duration and associated medical conditions, may influence the observed relationship. Overall, assessing depression and anxiety alongside routine metabolic investigations may provide a more comprehensive understanding of the health needs of patients with type 2 diabetes mellitus.

CONCLUSION

The proposed study will provide information regarding the prevalence of depressive and anxiety symptoms and their association with HbA1c levels. Routine screening using validated psychiatric instruments may help identify patients who require further psychological evaluation. Integrating psychiatric services with routine diabetes care may improve holistic patient management and contribute to better long-term health outcomes.

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