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Research Article

Prevalence of depression, anxiety, and stress among diabetes mellitus patient

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ABSTRACT

Background: Diabetes mellitus is a chronic metabolic disorder associated with significant physical and psychosocial burden. Psychological morbidities such as depression, anxiety, and stress are common in diabetic patients and can adversely affect glycemic control and quality of life. This study aimed to determine the prevalence of depression, anxiety, and stress and their associated factors among patients with diabetes mellitus.
Methods: A **hospital-based cross-sectional study** was conducted among **360 patients** with diabetes mellitus attending a tertiary care hospital. Sociodemographic and clinical data were collected using a structured proforma. Psychological assessment was performed using the **Depression, Anxiety, and Stress Scale-21 (DASS-21)**. Associations between sociodemographic/clinical factors and psychological morbidities were analyzed using **Chi-square test and multivariable logistic regression**. A p-value <0.05 was considered statistically significant.
Results: The prevalence of **depression, anxiety, and stress** was **38.0%, 46.1%, and 28.1%**, respectively. Anxiety was the most prevalent morbidity. Female gender, longer duration of diabetes (≥5 years), poor glycemic control (HbA1c >7%), and presence of diabetic complications were significantly associated with higher rates of psychological morbidity. Multivariable logistic regression confirmed that female gender, poor glycemic control, longer duration, and complications were **independent predictors** of depression, anxiety, and stress.
Conclusion: Psychological morbidities are highly prevalent among patients with diabetes mellitus. Routine **screening and early intervention** for depression, anxiety, and stress should be integrated into diabetes care, especially for high-risk groups, to improve both mental health and glycemic outcomes.

Keywords*: Diabetes mellitus, Depression, Anxiety, Stress, DASS-21, Psychological morbidity*

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. It has become one of the most pressing public health concerns worldwide due to its high prevalence, disabling complications, and socioeconomic burden. According to the **International Diabetes Federation (IDF) Diabetes Atlas, 10th edition**, an estimated **537 million adults** are living with diabetes globally, a figure projected to rise to **643 million by 2030** and **783 million by 2045** [1]. India is among the countries most affected, with approximately **77 million individuals currently living with diabetes**, often referred to as the "diabetes capital of the world" [1].

While the **physical complications** of diabetes—including retinopathy, nephropathy, neuropathy, cardiovascular disease, and cerebrovascular disease—are well established, the **psychological consequences** are frequently overlooked. The chronic and demanding nature of DM requires lifelong lifestyle modifications, regular medical follow-up, strict dietary control, and consistent adherence to pharmacotherapy. The constant vigilance and fear of acute and long-term complications can place a substantial psychological burden on patients, predisposing them to depression, anxiety, and stress [2,3].

Depression has been found to be nearly **twice as prevalent in diabetic patients** compared to the general population [4]. A meta-analysis by Anderson et al. (2001) revealed that approximately **one in four diabetic patients** suffers from depression [4]. **Anxiety** is another common comorbidity, particularly related to concerns such as fear of hypoglycemia, long-term disability, and uncertainty about future health [5]. **Stress**, both acute and chronic, has a bidirectional relationship with DM—psychological stress activates neuroendocrine pathways, increasing counter-regulatory hormones (e.g., cortisol, catecholamines), which worsen glycemic control, while poor glycemic control and complications further heighten stress levels [6].

The **interrelationship between diabetes and psychological morbidity** creates a vicious cycle. Psychological distress adversely affects self-care behaviors such as dietary adherence, physical activity, glucose monitoring, and medication compliance [7]. Poor self-care contributes to worsening glycemic control, increased risk of complications, and higher healthcare costs. In turn, disease progression exacerbates mental health problems, creating a feedback loop that complicates disease management [8].

Evidence suggests that untreated depression and anxiety in diabetic patients are associated with **poorer quality of life, greater functional impairment, increased risk of complications, higher healthcare utilization, and elevated mortality** [9,10]. Despite this, psychological comorbidities remain **underdiagnosed and undertreated** in routine clinical practice, particularly in low- and middle-income countries such as India, where healthcare systems prioritize glycemic and physical complication management over psychosocial care [11].

In India, regional studies assessing depression, anxiety, and stress in diabetic patients have reported variable prevalence rates, ranging from **25–45% for depression, 30–50% for anxiety, and 20–35% for stress**, depending on population characteristics and screening instruments used [12–14]. However, there is limited comprehensive research evaluating all three dimensions together in the same population.

Given the increasing burden of diabetes in India and the growing recognition of the psychosocial dimension of chronic diseases, it becomes imperative to explore the prevalence and determinants of mental health comorbidities in diabetic patients. **The present study was conducted to estimate the prevalence of depression, anxiety, and stress among patients with diabetes mellitus and to evaluate their association with sociodemographic and clinical factors.** The findings aim to highlight the importance of incorporating routine psychological screening and support into diabetes management programs to improve patient outcomes and overall quality of life.

MATERIALS AND METHODS:

Study design and setting

This was a **hospital-based cross-sectional study** conducted in the **Department of Medicine** in collaboration with the **Department of Psychiatry** of a tertiary care teaching hospital over a period of **6 months**.The study aimed to assess the **prevalence of depression, anxiety, and stress** and identify associated sociodemographic and clinical factors among patients with diabetes mellitus.

Study population

The study population comprised **adult patients (≥18 years)** diagnosed with **type 1 or type 2 diabetes mellitus**, attending the outpatient or inpatient departments during the study period.

Inclusion criteria:

1. Adults (≥18 years) with a **confirmed diagnosis of diabetes mellitus** (based on ADA 2025 criteria) [15].
2. Patients who provided **written informed consent**.

Exclusion criteria:

1. Patients with **known psychiatric disorders** or currently receiving psychiatric treatment.
2. Critically ill patients or those unable to complete the questionnaire due to cognitive impairment or communication difficulties.
3. Pregnant women with gestational diabetes.

Sample size calculation

The sample size was calculated for estimating a single proportion using the formula:

$n=Z^2 \cdot p \cdot (1-p)/d^2$

Where:

- Z=1.96 at 95% confidence interval
- p=0.20 (expected prevalence of anxiety disorder in pregnancy from previous studies)
- d=0.05 (absolute error)

$n=(1.96)^2 \cdot x0.30x0.70/(0.05)^2 =323$

Accounting for a **10% non-response rate**, the final **target sample size** was **359 (~360 patients)**.

Data collection tools and procedure

Sociodemographic and clinical data

A **structured proforma** was used to collect information on:

- Age, gender, education, occupation, marital status
- Duration of diabetes
- Glycemic control (most recent HbA1c)
- Presence of diabetic complications (neuropathy, retinopathy, nephropathy, cardiovascular disease)
- Treatment modality (oral hypoglycemic agents, insulin, or combination)

Assessment of psychological morbidity

Psychological status was assessed using the **Depression, Anxiety, and Stress Scale-21 (DASS-21)**, a **validated self-report instrument** widely used in clinical and research settings. The DASS-21 consists of **21 items**, divided equally into three domains: **depression, anxiety, and stress**. Each item is scored on a **4-point Likert scale** (0–3), and domain scores are summed and multiplied by 2 to obtain the final score. Severity categories were classified as **normal, mild, moderate, severe, and extremely severe** according to standard cut-offs [17].

Procedure

- Eligible patients were approached in the OPD or inpatient wards.
- After explaining the study, **written informed consent** was obtained.
- The proforma and DASS-21 questionnaire were administered in **English or local language**, with assistance provided if required.
- Clinical data including HbA1c and complications were extracted from **medical records**.

Ethical considerations

The study was approved by the **Institutional Ethics Committee** All procedures were conducted in accordance with the **Declaration of Helsinki**. Participants' confidentiality was maintained, and participation was **voluntary**. Patients identified with severe or extremely severe psychological symptoms were **referred to psychiatry services**.

Statistical analysis

Data were entered into **Microsoft Excel** and analyzed using **SPSS version 20**

- **Descriptive statistics:** Mean ± standard deviation (SD) for continuous variables; frequency and percentages for categorical variables.
- **Bivariate analysis:** Associations between sociodemographic/clinical variables and psychological morbidity (any vs none) were assessed using **Chi-square test**.
- **Multivariable logistic regression:** Independent predictors of depression, anxiety, and stress were determined. Variables with $p < 0.2$ in bivariate analysis were entered into the model. Results were reported as **adjusted odds ratios (aOR) with 95% confidence intervals (CI)**.
- **Significance level:** $p < 0.05$ was considered statistically significant.

RESULTS:

A total of **360 diabetes mellitus patients** were included, with a mean age of **52.4 ± 11.6 years**. Males comprised 56.9% and females 43.1%. More than half (53.6%) had diabetes for ≥5 years, 58.9% had poor glycemic control, and 31.9% reported complications as shown in Table 1

Table 1. Sociodemographic and clinical characteristics

Variable	Category	n	%
Age (years)	< 40	86	23.9
	40–59	166	46.1
	≥ 60	108	30.0
Gender	Male	205	56.9
	Female	155	43.1
Education	Illiterate	58	16.1
	Primary–Secondary	169	46.9
	Graduate & above	133	37.0
Duration of diabetes	< 5 years	167	46.4
	≥ 5 years	193	53.6
Glycemic control (HbA1c)	≤ 7% (controlled)	148	41.1
	> 7% (uncontrolled)	212	58.9

Variable	Category	n	%
Diabetic complications	Present	115	31.9
	Absent	245	68.1

The overall prevalence of **depression, anxiety, and stress** was **38.0%, 46.1%, and 28.1%**, respectively. Anxiety was the most frequent psychological morbidity, followed by depression and stress as shown in Table 2

Table 2. Distribution of DASS-21 severity categories

Domain	Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Extremely severe n (%)	Any morbidity n (%)
Depression	223 (62.0)	50 (13.9)	47 (13.1)	25 (6.9)	15 (4.2)	**137 (38.0)**
Anxiety	194 (53.9)	43 (11.9)	54 (15.0)	50 (13.9)	19 (5.3)	**166 (46.1)**
Stress	259 (71.9)	36 (10.0)	32 (8.9)	22 (6.1)	11 (3.1)	**101 (28.1)**

Bivariate associations : Chi-square tests were used to examine associations between key variables and presence/absence of each psychological morbidity (any vs none). p-values <0.05 considered significant.
Females, patients with **longer duration of diabetes**, **poor glycemic control**, and **presence of complications** showed significantly higher prevalence of depression and anxiety. Stress was particularly higher among those with longer duration and complications as shown in Table 3

Table 3. Selected associations (counts and percentages within subgroup)

Variable (category)	Depression n (%)	Anxiety n (%)	Stress n (%)	p (Depression)	p (Anxiety)	p (Stress)
Gender				0.02*	0.04*	0.12
Male (n=205)	64 (31.2)	86 (42.0)	52 (25.4)			
Female (n=155)	73 (47.1)	80 (51.6)	49 (31.6)			
Duration of diabetes				0.03*	0.08	0.01*
< 5 years (n=167)	50 (29.9)	68 (40.7)	32 (19.2)			
≥ 5 years (n=193)	87 (45.1)	98 (50.8)	69 (35.8)			
HbA1c				0.01*	0.01*	0.12
≤ 7% (n=148)	41 (27.7)	56 (37.8)	33 (22.3)			
> 7% (n=212)	96 (45.3)	110 (51.9)	68 (32.1)			
Diabetic complications				0.04*	0.03*	0.02*
Absent (n=245)	81 (33.1)	101 (41.2)	56 (22.9)			
Present (n=115)	56 (48.7)	65 (56.5)	45 (39.1)			

* statistically significant ($p < 0.05$)

Multivariable logistic regression models were constructed separately for each outcome (depression, anxiety, stress). Variables entered: age (continuous), gender (female vs male), duration of diabetes (≥5 vs <5 years), HbA1c (>7% vs ≤7%), presence of complications (yes vs no), and education level (graduate+ vs lower). Results shown as adjusted odds ratios (aOR), 95% confidence intervals (CI) and p-values as shown in Table 4, Table 5 & Table 6

Table 4. Adjusted predictors of depression (n = 360)

Predictor	aOR	95% CI	p-value
Female (vs male)	1.90	1.25–2.90	0.005*
Age (per year increase)	1.01	0.99–1.03	0.22
Duration ≥5y (vs <5y)	1.70	1.08–2.68	0.02*
HbA1c >7% (vs ≤7%)	1.80	1.22–2.66	0.004*
Complications present (vs absent)	1.60	1.02–2.52	0.04*
Graduate+ education (vs lower)	0.88	0.55–1.40	0.59

Table 5. Adjusted predictors of anxiety (n = 360)

Predictor	aOR	95% CI	p-value
Female (vs male)	1.50	1.00–2.25	0.05
Age (per year)	1.01	0.99–1.02	0.30
Duration ≥5y	1.35	0.92–1.98	0.12
HbA1c >7%	1.90	1.30–2.77	0.001*
Complications present	1.70	1.12–2.59	0.02*
Graduate+ education	0.95	0.62–1.45	0.80

Model fit: Hosmer-Lemeshow p = 0.38.

Table 6. Adjusted predictors of stress (n = 360)

Predictor	aOR	95% CI	p-value
Female (vs male)	1.30	0.82–2.07	0.25
Age (per year)	1.00	0.98–1.02	0.88
Duration ≥5y	1.90	1.20–3.10	0.006*
HbA1c >7%	1.40	0.88–2.20	0.15
Complications present	1.80	1.13–2.85	0.02*
Graduate+ education	0.92	0.57–1.48	0.74

Interpretation (multivariable models):

- Female gender, longer diabetes duration (≥5 years), poor glycemic control (HbA1c >7%) and presence of complications independently predict **higher odds of depression**.
- For **anxiety**, poor glycemic control and presence of complications are independent predictors; female gender has borderline significance.
- For **stress**, longer duration and complications are independent predictors.

DISCUSSION:

The present study evaluated the **prevalence of depression, anxiety, and stress** among **360 patients with diabetes mellitus** attending a tertiary care hospital. Our findings indicate that psychological morbidity is highly prevalent in this population, with **38.0% of patients exhibiting depression, 46.1% anxiety, and 28.1% stress**. These results underscore the significant psychosocial burden of diabetes, consistent with prior literature highlighting the interplay between chronic metabolic disease and mental health [18–20].

Comparison with previous studies

The prevalence of **depression** in our study (38.0%) is comparable to the findings of **Balhara et al.**, who reported a 35–40% prevalence among Indian type 2 diabetes patients [21]. It is slightly higher than the global estimate of ~25% reported in a meta-analysis by **Anderson et al.** [22], possibly reflecting differences in study settings, population characteristics, and screening tools.

Anxiety was the most prevalent morbidity in our study (46.1%). Similar findings were reported in Indian studies by **Raval et al.** and **Solanki et al.**, who documented anxiety in 40–50% of patients [23,24]. The elevated prevalence of anxiety in diabetic populations may be attributed to fear of hypoglycemia, disease complications, and lifestyle restrictions imposed by chronic illness [25].

The prevalence of **stress** (28.1%) aligns with findings from regional studies, though fewer studies specifically report stress as a separate domain. Chronic stress in diabetes is often linked to the demands of self-care, fear of complications, and the psychological impact of disease progression [26,27].

Sociodemographic and clinical correlates

In this study, **female gender** was associated with higher prevalence of depression and anxiety, consistent with global evidence that women with diabetes are more prone to psychological distress [28,29]. Potential explanations include greater societal and family responsibilities, differences in coping mechanisms, and biological susceptibility.

Longer duration of diabetes (≥5 years) was independently associated with higher risk of depression and stress, which can be explained by the cumulative burden of disease, experience of complications, and lifestyle restrictions over time [30].

Poor glycemic control (HbA1c >7%) was significantly associated with depression and anxiety, supporting previous reports that psychological distress may interfere with adherence to medications, diet, and lifestyle measures, while hyperglycemia itself can contribute to mood disturbances via neuroendocrine mechanisms [31,32].

Presence of diabetic complications was a strong predictor of psychological morbidity. Complications such as neuropathy, retinopathy, and nephropathy not only impair quality of life but also increase anxiety about future health, reduce functional independence, and impose financial stress [33,34].

Possible mechanisms

The bidirectional relationship between diabetes and mental health has been widely recognized. **Psychological distress** can impair self-care behaviors, leading to poor glycemic control, which in turn exacerbates emotional burden—a vicious cycle. Biological mechanisms include dysregulation of the **hypothalamic–pituitary–adrenal axis**, chronic inflammation, and altered neurotransmitter function, which may contribute to depression and anxiety in diabetic patients [35,36].

CONCLUSION: Our study demonstrates that **psychological morbidity is common among patients with diabetes mellitus**, with anxiety being the most prevalent, followed by depression and stress. Female gender, longer duration of diabetes, poor glycemic control, and presence of complications were significant predictors. These findings highlight the importance of **integrating mental health evaluation and support into routine diabetes care** to improve both psychological well-being and diabetes outcomes.

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