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Original Research Article

PREVALENCE AND PREDICTORS OF DEPRESSION AND ANXIETY AMONG DIABETIC PATIENTS ATTENDING PRIMARY HEALTH CENTERS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Diabetes mellitus is a chronic non-communicable disease frequently associated with psychological comorbidities such as depression and anxiety, which often remain undiagnosed in primary healthcare settings. Timely detection and management of these comorbidities are essential for improving overall treatment adherence and quality of life in diabetic patients. The objective is to estimate the prevalence of depression and anxiety among patients with Type 2 Diabetes Mellitus (T2DM) attending primary health centers and to identify key sociodemographic, clinical, and behavioral predictors associated with these psychological conditions.

Materials and Methods: A cross-sectional study was conducted among 400 adult patients with T2DM attending four purposively selected Primary Health Centers (PHCs). Data were collected using a pretested semi-structured questionnaire covering sociodemographic details, clinical history, lifestyle factors, and standard psychological scales—PHQ-9 for depression and GAD-7 for anxiety. Statistical analysis included descriptive statistics, chi-square tests for bivariate associations, and multivariate logistic regression to identify adjusted odds ratios (AORs) for predictors of depression.

Results: The prevalence of depression (PHQ-9 score ≥10) was 41.5%, while anxiety (GAD-7 score ≥10) was reported in 37.3% of participants. No statistically significant association was observed between depression and gender, age, educational status, socioeconomic class, glycemic control, diabetic complications, or physical activity. However, substance use was significantly associated with lower odds of depression in multivariate analysis (AOR: 0.618; 95% CI: 0.384–0.996; p = 0.048). None of the other examined variables showed significant associations in the logistic regression model.

Conclusion: There is a high burden of undiagnosed depression and anxiety among diabetic patients attending PHCs. The lack of consistent demographic or clinical predictors emphasizes the need for universal mental health screening in diabetic care, rather than selective targeting. Integrated care models that combine NCD and mental health services at the primary care level are urgently needed.

Keywords: Type 2 Diabetes Mellitus, Depression, Anxiety, PHQ-9, GAD-7, Primary Health Center, Psychological comorbidity, Substance use, Mental health screening.

INTRODUCTION

Diabetes mellitus (DM) is a chronic, progressive metabolic disorder characterized by elevated blood glucose levels due to defects in insulin secretion, insulin action, or both. It has emerged as a global public health challenge, with over 537 million adults estimated to be living with diabetes as of 2021, and this figure is projected to rise to 643 million by 2030 (International Diabetes Federation). India, often referred to as the "diabetes capital of the world," bears a disproportionately high burden of the disease, with an estimated 77 million diabetic individuals, many of whom remain undiagnosed or poorly managed.[1]

While the physical complications of diabetes—such as nephropathy, retinopathy, neuropathy, and cardiovascular diseases—are well-documented, the psychological impact of diabetes has only recently begun to receive adequate attention. Among the psychological comorbidities, depression and anxiety stand out as the most prevalent and debilitating. The bidirectional relationship between diabetes and mental health disorders has been well established in recent literature. Depression and anxiety not only increase the risk of developing diabetes but also exacerbate the disease's progression through poor self-care, reduced medication adherence, sedentary behavior, and unhealthy eating patterns.[2-4]

Research has shown that individuals with diabetes are twice as likely to suffer from depression compared to the general population. Similarly, anxiety disorders, especially generalized anxiety and health-related worries, are more common in diabetic patients due to the constant burden of disease management and fear of complications. This comorbidity significantly impairs quality of life, increases healthcare costs, and poses challenges in achieving glycemic targets. In low-resource settings, especially at the level of primary health care, the problem is compounded by limited mental health services, lack of screening protocols, and poor awareness among both patients and healthcare providers.[5,6]

Primary health centers (PHCs) in India serve as the first point of contact for a large portion of the population, especially in rural and semi-urban areas. These centers play a vital role in the prevention, early detection, and management of non-communicable diseases, including diabetes. However, mental health screening and interventions remain largely absent from PHC services.[7,8] Patients attending these centers are often managed for physical ailments, while underlying psychological conditions remain undiagnosed and untreated, further deteriorating disease outcomes.

Despite the known link between diabetes and mental health disorders, data on the prevalence and determinants of depression and anxiety among diabetics in primary care settings in India are limited. Most studies have been conducted in tertiary hospitals or urban settings, leaving a gap in understanding the burden at the primary level, where most patients initiate and continue their diabetes care. This study, therefore, aims to fill this gap by assessing the prevalence of depression and anxiety and identifying their key sociodemographic, clinical, and lifestyle-related predictors among diabetic patients attending primary health centers. The findings are expected to inform policy-makers and healthcare providers about the urgent need for integrating mental health services into primary diabetes care, thereby improving overall patient outcomes.

MATERIALS AND METHODS

A facility-based, cross-sectional observational study was conducted over a period of six months (January 2025 to June 2025) in four purposively selected government Primary Health Centers (PHCs) located in rural and semi-urban areas of----------. These PHCs were chosen based on patient load, availability of diabetes care services, and willingness of staff to participate in the study.

Each PHC catered to an average population of 25,000–30,000 people, with an average daily outpatient attendance of 80–100 patients. Diabetes care services at these PHCs include physician consultations, basic blood glucose monitoring, and drug dispensing; however, there were no formal systems for mental health screening or counseling.

The study included adult patients (aged ≥18 years) diagnosed with Type 2 Diabetes Mellitus (T2DM) for at least 6 months and attending the outpatient clinics of the selected PHCs during the study period.

Inclusion Criteria

- Adults aged 18 years and above.
- Confirmed diagnosis of T2DM for ≥6 months.
- Willing and able to give informed consent.

Exclusion Criteria

- Known psychiatric illness under treatment.
- Critically ill or with major cognitive impairment.
- Patients with gestational diabetes or type 1 diabetes.

Sample Size Estimation: The sample size was calculated using the formula for single population proportion:

Where:

- Z = 1.96 for 95% confidence level
- p = expected prevalence of depression among diabetics = 0.40 (based on previous studies),[9]
- d = margin of error = 0.05
- Adding 10% for non-response, the final sample size was 400 patients.

A systematic random sampling method was used. On each clinic day, every 3rd or 4th eligible patient attending the diabetic clinic was invited to participate, depending on the daily patient flow. If a selected patient refused, the next eligible patient was approached.

Methodology: A structured interview schedule was used, comprising the following sections:

1. **Sociodemographic Profile**

Age, gender, marital status, education, occupation, monthly income, and socioeconomic status (based on Modified BG Prasad Scale 2024).

2. **Clinical Characteristics**

- Duration of diabetes
- Glycemic control (assessed by last 3 months' HbA1c, if available; otherwise, FBS and PPBS values)
- Presence of complications (e.g., neuropathy, retinopathy, nephropathy, foot ulcers, cardiovascular disease)
- Comorbidities (e.g., hypertension, dyslipidemia)
- Type and frequency of treatment adherence
- BMI and waist circumference

3. **Lifestyle and Behavioral Assessment**

- Physical activity level (using WHO STEPS questionnaire)
- Diet patterns (e.g., adherence to diabetic diet)
- Substance use (tobacco, alcohol)
- Family and social support

4. **Psychological Assessment**

- PHQ-9 (Patient Health Questionnaire-9) was used to assess depression. A score of ≥10 was considered clinically significant.
- GAD-7 (Generalized Anxiety Disorder-7) was used to assess anxiety. A score of ≥10 indicated moderate-to-severe anxiety.

These tools are validated, reliable, and widely used in clinical and research settings. Interviews were conducted in the local language (Hindi) by trained healthcare professionals after obtaining informed consent.

Table A: Scoring and Interpretation of PHQ-9 and GAD-7 Scales

Score Range	PHQ-9 Interpretation	GAD-7 Interpretation
0–4	Minimal	Minimal
5–9	Mild	Mild
10–14	Moderate	Moderate
15–19	Moderately Severe	Moderately Severe
20–27	Severe	Severe

Ethical approval was obtained from the Institutional Ethics Committee of the institute and Written informed consent was obtained from all participants. Patients with high scores on PHQ-9 or GAD-7 were referred to the nearest Community Health Centre or District Hospital for psychiatric evaluation and management.

Statistical Analysis: All data were double-entered and validated in Microsoft Excel, then imported into SPSS version 26.0 for analysis. Descriptive statistics were used to summarize sociodemographic and clinical characteristics. Means ± SD were reported for continuous variables, and frequencies/percentages for categorical variables. Chi-square tests were applied to assess associations between depression/anxiety and independent variables. Multivariate logistic regression analysis was conducted to identify independent predictors, adjusting for potential confounders. Odds ratios (ORs) with 95% confidence intervals (CI) and p-values <0.05 were considered statistically significant.

RESULTS

As per table 1 out of 400 participants, 232 (58%) were female and 168 (42%) were male. This reflects a female predominance among diabetic patients attending primary health centers in the study setting. The largest proportion of participants were in the 50–59 years age group (150 participants; 37.5%), followed by the 40–49 years group (110; 27.5%). Participants aged ≥60 years constituted 25% (100 individuals), and only 10% (40 participants) were younger than 40.A majority of the participants, 248 (62%), had less than secondary education, while only 152 (38%) had education up to or beyond secondary level. Low socioeconomic status was reported by 184 (46%) participants, followed by middle class (148; 37%) and high-income group (68; 17%).This reflects that a significant proportion (over 80%) belong to low or middle-income strata, highlighting the role of economic disadvantage in both the prevalence and complications of chronic diseases like diabetes.

Table 1: Sociodemographic Profile of Study Participants (N = 400)

Variable	Category	Frequency (n)
Gender	Male	168
	Female	232
Age Group	< 40	40
	40–49	110
	50–59	150
	≥ 60	100
Education Level	< Secondary	248
	≥ Secondary	152
Socioeconomic Status	Low	184
	Middle	148
	High	68

Table 2: Clinical Profile of Participants

Clinical Variable	Category	Frequency (n)
Glycemic Control	Controlled	192
	Uncontrolled	208
Diabetic Complications	Yes	152
	No	248
Duration of Diabetes	<5 years	180
	5–10 years	130
	>10 years	90

As per [Table 2] around 208 (52%) participants had uncontrolled blood glucose levels, indicating that over half the patients attending PHCs had suboptimal glycemic management. This suggests potential gaps in treatment adherence, lifestyle modification, or therapeutic access at the primary care level. 152 (38%) participants reported one or more diabetes-related complications, while 248 (62%) did not. This indicates that more than one-third of the patients already had end-organ involvement, which may worsen over time if not aggressively managed. The high proportion of uncontrolled diabetics and long-standing disease cases underlines the importance of strengthening diabetes education, glycemic monitoring, and individualized follow-up at PHCs. As diabetes duration and complications are linked to poor quality of life and increased psychological distress, screening for depression and anxiety should be routine, especially in those with longer disease duration or existing complications.

Table 3: Lifestyle and Behavioral Characteristics

Lifestyle Variable	Category	Frequency (n)
Physical Activity	Active	182
	Inactive	218
Substance Use	Yes	104
	No	296

The findings point toward modifiable lifestyle risk factors that are highly prevalent in the diabetic population. Over half are physically inactive, increasing risk of poor glycemic control and depression. One in four reports substance use, necessitating behavior change interventions. These behaviors must be routinely assessed and addressed through tailored health education, behavioral counseling, and follow-up in primary care settings.

Table 4: Prevalence of Depression and Anxiety

Outcome	Status	Frequency (n)
Depression (PHQ-9 ≥10)	Yes	166 (41.5%)
	No	234 (58.5%)
Anxiety (GAD-7 ≥10)	Yes	149 (37.3%)
	No	251 (62.7%)

As per [Table 4] around 166 out of 400 participants (41.5%) were found to have moderate to severe depression based on PHQ-9 scores ≥10. This indicates that over 2 in every 5 diabetic patients attending PHCs are experiencing clinically significant depressive symptoms. Such a high burden of depression in this chronic disease population highlights an urgent need for routine mental health screening and intervention strategies in primary care. 149 participants (37.3%) screened positive for moderate to severe anxiety symptoms using GAD-7 scores ≥10. This suggests that more than one-third of diabetic patients are also affected by anxiety, which may interfere with self-management, medication adherence, and glycemic control. A large proportion of this population is burdened with either depression, anxiety, or both, which is consistent with global trends showing a high rate of psychological comorbidity among diabetic patients. The dual presence of depression and anxiety in chronic illnesses is associated with worse clinical outcomes, increased healthcare costs, and reduced quality of life.

Table 5: Demographic association with Depression

Variable	Chi²	p-value	Statistically Significant
Gender	0.13	0.7144	No
Age Group	1.69	0.6396	No
Education Level	0.06	0.8067	No
Socioeconomic Status	1.32	0.5162	No
Glycemic Control	0.28	0.5971	No
Diabetic Complications	0.02	0.8745	No
Duration of Diabetes	0.95	0.6216	No
Physical Activity	0.10	0.7474	No
Substance Use	3.36	0.0669	No

All p-values were >0.05, indicating that none of the evaluated demographic, clinical, or lifestyle factors showed a statistically significant association with depression using bivariate analysis (Chi-square test). Substance use showed a $Chi^2 = 3.36$ and $p = 0.0669$, which is close to the significance threshold. While not statistically significant at the 0.05 level, it suggests a possible trend that may achieve significance in a larger sample or after adjusting for confounders (as confirmed in logistic regression). No significant association was observed between depression and gender, age group, education, or socioeconomic status, indicating that depression was evenly distributed across these groups.

Table 6: Predictors of Depression

Variable	Adjusted OR	95% CI	p-value	Significant
Gender: Male	1.069	0.704 – 1.623	0.756	No
Age Group: 50–59	1.333	0.797 – 2.231	0.273	No
Age Group: <40	1.124	0.515 – 2.455	0.769	No
Age Group: ≥60	0.955	0.544 – 1.675	0.871	No
Education: ≥Secondary	0.940	0.616 – 1.433	0.774	No
SES: Low vs High	1.220	0.662 – 2.249	0.523	No
SES: Middle vs High	1.398	0.750 – 2.608	0.292	No
Glycemic Control: Uncontrolled	1.099	0.724 – 1.666	0.658	No
Diabetic Complications: Yes	0.932	0.607 – 1.432	0.749	No
Duration: <5 years	0.815	0.506 – 1.315	0.402	No
Duration: >10 years	0.861	0.488 – 1.518	0.604	No
Physical Activity: Inactive	1.094	0.719 – 1.665	0.673	No
Substance Use: Yes	0.618	0.384 – 0.996	0.048	Yes

The multivariate model reinforces that routine variables collected in diabetes care may not reliably predict mental health comorbidities, highlighting the importance of universal depression screening in this population. The unexpected significant association with substance use calls for deeper behavioral health assessments and possibly more nuanced patient interviews or qualitative inquiry.

DISCUSSION

This cross-sectional study explored the prevalence and predictors of depression and anxiety among patients with Type 2 Diabetes Mellitus attending primary health centers (PHCs). The study revealed that 41.5% of participants had moderate to severe depression (PHQ-9 ≥10), and 37.3% had moderate to severe anxiety (GAD-7 ≥10). These findings highlight a substantial burden of psychological distress among diabetic individuals in primary care settings, where mental health often remains under-recognized and untreated.

The observed prevalence of depression and anxiety aligns with findings from similar Indian and international studies. For instance, a meta-analysis by Roy et al. (2022) reported a pooled prevalence of depression among diabetics in India at around 38%. Likewise, anxiety levels in diabetic populations have been consistently reported between 30% and 45%, particularly in settings with limited mental health support.[2]

Several factors may contribute to the high prevalence found in this study, including the chronicity of the disease, fear of complications, financial burden, and reduced social functioning.[4-6] The lack of integrated mental health services in PHCs may further exacerbate this issue, as patients remain undiagnosed and untreated despite frequent visits to health facilities.

Contrary to expectations, sociodemographic factors such as gender, age, educational status, and socioeconomic class were not significantly associated with depression or anxiety in this study. This finding contrasts with literature where female gender and lower socioeconomic status have been identified as consistent predictors of mental health issues among diabetics.[7,8] The non-significance in our setting may reflect the homogeneity of the rural/semi-urban population or limitations in sample diversity.

Likewise, clinical characteristics—including glycemic control, duration of diabetes, and presence of complications—were not significantly associated with depression or anxiety. This suggests that psychological morbidity among diabetics might not be solely driven by disease severity or duration but also by subjective perceptions, social support, and coping mechanisms. Although poor glycemic control has been associated with higher psychological distress in some studies, such a relationship was not observed here.[9,10]

An important and somewhat counterintuitive finding was the association between substance use and lower odds of depression, which was statistically significant in the multivariate model (Adjusted OR: 0.618; 95% CI: 0.384–0.996; p=0.048).[11,12] While substance use is typically associated with increased psychiatric morbidity, the inverse relationship in our study could be due to:

- Self-medication behavior where individuals use tobacco or alcohol to transiently relieve psychological symptoms.
- Underreporting or social desirability bias in self-reported depression symptoms among substance users.

- Confounding factors such as gender or socioeconomic status not fully accounted for.

Further longitudinal or qualitative studies are necessary to clarify this relationship.

Physical inactivity, though more common among depressed individuals, did not show a statistically significant association in this sample. However, its relevance as a modifiable risk factor should not be dismissed given the known benefits of exercise on both glycemic control and mental well-being.

A key strength of this study is its focus on primary care settings, which are the most accessible point of contact for a majority of the Indian population. The study underscores the urgent need for mental health screening protocols to be incorporated into the standard management of diabetes at PHCs. The use of validated tools (PHQ-9 and GAD-7) and structured interviews ensures a standardized assessment of psychological morbidity.[8]

These findings support the integration of non-communicable disease (NCD) and mental health programs, such as India's NPCDCS and NMHP, to implement collaborative care models. Training PHC staff in basic psychological assessment and counseling could substantially improve patient outcomes.[9,12]

Limitations

Several limitations must be acknowledged:

- The cross-sectional design precludes establishing causality between predictors and mental health outcomes.
- Self-reporting tools, while validated, may still be prone to reporting bias.
- Variables such as social support, diabetes-related distress, and medication adherence were not assessed, which may have provided additional insights.
- The sample may not be representative of all regions due to purposive selection of PHCs.

This study contributes to the growing evidence that depression and anxiety are highly prevalent among diabetic patients even in primary care settings. Although no strong demographic or clinical predictors were identified, the findings advocate for routine mental health screening and the integration of psychosocial care within diabetes management, particularly in resource-constrained rural areas.

CONCLUSION

This study highlights a high prevalence of depression (41.5%) and anxiety (37.3%) among diabetic patients attending primary health centers, underscoring a critical but often overlooked aspect of chronic disease management. Despite extensive evaluation, no sociodemographic or clinical factors were found to be significantly associated with depression, except for substance use, which showed a statistically significant inverse association. These findings point toward the multifactorial nature of psychological distress in diabetics, which may not always be explained by traditional risk factors.

Given the burden revealed, there is an urgent need to integrate routine mental health screening and basic psychological support into primary diabetes care. Early identification and appropriate referral for mental health issues could substantially improve both psychological well-being and glycemic outcomes among diabetic patients in low-resource settings.

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