African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper   **Open Access**

Psychiatric Co-morbidities among People with Diabetes Mellitus

[1] Rajesh Krishnan, [2] Priyamol George *, [3] Ramya Revathi Rajagopal

[1] Assistant Professor, Department of Psychiatry, Vinayaka Mission's Medical College & Hospital, Karaikal, Puducherry, India. Email ID: drrkrajeshkrishnan@gmail.com

[2] Consultant Clinical Psychologist, Swan Children's Clinic, Chennai, Tamilnadu, India. Email ID: priyamolg@gmail.com

[3] Specialty Doctor-General Adult Psychiatry, NHS Scotland. Email ID: rramyarevathi@gmail.com

Corresponding Author: Priyamol George
Email ID: priyamolg@gmail.com

Abstract:
Diabetes mellitus (DM) has become one of the world's most significant health problems. World Health Organization (WHO) estimated that the number of diabetic patients worldwide in 2000 was 171 million, likely to increase to 366 million by 2030. Diabetes is occasionally accompanied by psychiatric morbidity. The relationship between diabetes and psychiatric illnesses is not known clearly at present. The presence of psychiatric issues complicates the treatment of the original disease and influences the outcome both in the physical illness and psychiatric complications. This study investigates the prevalence of psychiatric morbidity among 138 patients with type II diabetes mellitus at SRM Medical College Hospital & Research Centre, Kattankulathur, Tamilnadu, India. The results showed that 26.08% had depression, and 23.91% had anxiety disorder. Physical comorbidities included systemic hypertension and dyslipidemia, with a significant association between glycemic control and depression, as well as anxiety disorder. Glycemic control showed positive correlations with age of onset and duration of illness, suggesting HbA1c as a predictor of poor diabetes control and mental health conditions like anxiety and depression.
Keywords: Diabetes mellitus, Psychiatric morbidity

Introduction:

Diabetes mellitus (DM) poses a major global health challenge arising from either insulin resistance or insufficient insulin secretion. Type 1 diabetes typically manifests early in life, when individuals produce little to no insulin due to an autoimmune process primarily involving T cells, targeting and destroying insulin-producing β cells in the pancreas. On the other hand, type 2 diabetes, more common in adults, is increasingly affecting children. Patients with type 2 diabetes often display insulin resistance, but as they age, insulin production diminishes, leading to a substantial number eventually requiring insulin therapy. Effectively managing diabetes on an individual basis within a supportive social network is crucial, considering it is a persistent and widespread medical condition. As per the Diabetes Atlas 2006, India holds the record for the highest number of diabetic patients worldwide. India has approximately 40.9 million diabetic patients, with projections indicating that the number will rise to 69.9 million by 2025 [1]. The Chennai Urban Rural Epidemiology Study (CURES) found that the crude prevalence of diabetes mellitus in Chennai was 15.5% (age-standardized: 14.3%), with impaired glucose tolerance at 10.6% (age-standardized: 10.2%). Over 14 years, the prevalence of diabetes mellitus in Chennai increased significantly. Between 1989 and 1995, it rose from 8.3% to 11.6%, increased to 16.3% between 1995 and 2000, and reached 14.3% between 2000 and 2004. These findings indicate a substantial 72.3% increase in the prevalence of diabetes mellitus within Chennai over the 14 years studied [2].

Prevalence of psychiatric disorders in diabetes mellitus:

Diabetes is prevalent among individuals with psychotic disorders like schizophrenia and schizoaffective disorders. However, accurate prevalence rates are challenging due to underdiagnosis in this population. Studies indicate that the incidence of diabetes among individuals with psychosis is higher compared to the general population. Recorded prevalence rates range from 1-26% to 50% (median 13%), highlighting the increased risk of diabetes in individuals with psychotic disorders. Individuals diagnosed with psychotic disorders, such as schizophrenia and schizoaffective disorders, exhibit a notable prevalence of diabetes. However, accurately estimating this prevalence is challenging due to underdiagnosis among patients with psychosis. Various studies indicate that the prevalence of diabetes among individuals with psychotic disorders surpasses that of the general population. They reported that prevalence rates among individuals

with psychosis range from 1-26% to 50% across different studies, with a median prevalence of 13% [3]. In a meta-analysis conducted by Knol et al.,2006, involving nine studies examining the comorbidity of depression and diabetes, findings suggest that depressed adults have a 37% higher likelihood of developing Type II DM compared to individuals without depression [4]. Gildea et al. (2009) documented elevated results in glucose tolerance tests following oral, as opposed to intravenous, administration of dextrose in 30 patients with manic-depressive disorder [5]. Anxiety disorder with Diabetes leads to symptom severity and persistence of symptoms and dramatically impairs the individual role in the social and occupational milieu [6].

Diabetes mellitus-related metabolic changes and psychosocial stressors can contribute to depression. The long-term effects of diabetes and its complications can significantly diminish the quality of life. Dysfunctions in the hypothalamic-pituitary-adrenocortical axis result in excess cortisol production and mood fluctuations. Inadequate glycemic control heightens the risk of emotional disorders. Depression and diabetes commonly coexist, compounding their impact on individuals' well-being.

Methodology:

Aim:

To study the prevalence of psychiatric morbidity among patients with type II diabetes mellitus

Objectives:

- To assess the prevalence of psychiatric morbidity in type II diabetes mellitus patients.
- To compare type II diabetes mellitus patients on various parameters in physical and psychological spheres.

Hypothesis:

Null hypothesis:

- Psychiatric morbidity is not prevalent in type II diabetes mellitus patients.
- There is no significant difference in type II diabetes mellitus patients on various parameters in the physical and psychological spheres

Sample:

The present study's sample (N = 138) was selected from SRM Medical College Hospital & Research Centre, Kattankulathur, Tamilnadu, India.

Inclusion criteria:

- Patients attending Diabetology outpatient department

- A diagnosis of diabetes mellitus type 2
- Willing to give informed consent

Exclusion criteria:

- With complications compromising sensorium
- Unwilling or unable to give informed consent
- On medications that may induce psychiatric issues

Measurements:

1. Demographic Data Sheet: The demographic data were collected using personal data sheets from the patients with diabetes attending the Diabetology OPD; they were interviewed and assessed using Diabetic history and Biochemical Parameters for diabetes (HbA1c). The patient's OP records were evaluated to obtain a glycemic control status through HbA1, and information was obtained from the patient, reliable informant, and medical records.

2. General Health Questionnaire: The General Health Questionnaire (GHQ) is a self-report screening tool to detect possible psychological disorders [7]. Since Goldberg's development in the 1970s, it has been extensively used in different settings and cultures. The questionnaire was initially developed as a 60-item instrument, but at present, a range of shortened versions of the questionnaire, including the GHQ-30, the GHQ-28, the GHQ-20, and the GHQ-12, is available. The scale asks whether the respondent has recently experienced a particular symptom or behavior.

3. Mini-international neuropsychiatric interview (MINI): The Mini-International Neuropsychiatric Interview (M.I.N.I.) is a short structured diagnostic interview developed by Lecrubier in 1997 for DSM-IV and ICD-10 psychiatric disorders [8]. It assesses the 17 most common psychiatric disorders and suicidality.

4. Hamilton Depression Rating Scale: The Hamilton Rating Scale for Depression (HRSD), also called the Hamilton Depression Rating Scale (HDRS), sometimes also abbreviated as HAM-D, is a multiple-item questionnaire used to indicate depression and as a guide to evaluating recovery [9]. The scale was published in 1960 and revised in 1966, 1967, 1969, and 1980. The questionnaire is designed for adults and is used to rate the severity of their depression by probing 21 areas related to depression, including mood, feelings of guilt, suicide ideation, insomnia, agitation or retardation, anxiety, weight loss, and somatic symptoms.

5. Hamilton Anxiety Rating Scale: The Hamilton Anxiety Rating Scale (HAM-A), published by Max Hamilton in 1959, is a psychological questionnaire clinicians use to rate the severity of a patient's anxiety [10]. The scale consists of 14 items designed to assess the severity of a patient's anxiety. Each of the 14 items contains several symptoms, and each group of symptoms is rated on a scale of zero to four, with four being the most severe.

Procedure:

The study subjects were taken from the Diabetology Department OP section at SRM Medical College Hospital. Those who fulfilled the appropriate criteria were included in this study. Informed consent was obtained from the subjects. A thorough clinical evaluation was done to discover any physical complications, psychiatric illnesses, or drug treatments since these factors are the confounding factors of this study.

The patient's OP records were evaluated to obtain a glycemic control status through HbA1c, and diabetic history was recorded, such as duration of illness, type of diabetes, and age of onset. Subjects were first assessed using General Health Questionnaire-12 for general physical condition, followed by M.I.N.I - Mini International Neuropsychiatric Interview to evaluate psychiatric morbidity. After administering the MINI neuropsychiatric interview, patients were found to be primarily depressed and anxious; there were 2 cases of dysthymia, one panic disorder, and 1 case of social phobia. They were further evaluated with the Hamilton Depression Scale (HAM-D) and Hamilton Anxiety Scale (HAM-A), and the scores were recorded.

Statistical Analysis:

SPSS version 26 was used to examine each of the variables.

Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were applied to the demographic details, illness parameters, and psychiatric morbidity of diabetes mellitus type II patients. The chi-square test was used for categorical variables, and the Spearman correlation was used to find a correlation.

Ethical Considerations:

The ethical considerations followed include:

• Informed Consent: Informed consent was obtained during all data collection steps throughout the study.

• Confidentiality: The data collected in the study was utilized solely for this research and was not shared elsewhere or utilized for any undisclosed purposes.

• Anonymity: The participants' identity or personal information was not disclosed.

 • Withdrawal: Participants held the right to withdraw from the data collection process or withhold their data from being used during the study.

Results:

Table 1:
Shows the frequency and percentage of Socio-demographic data of Type-2 diabetes patients

Socio-demographic data	Frequency	Percentage
Male	69	50.0
Female	69	50.0
Marital status:		
Single	1	.7
Married	133	96.4
Widowed	3	2.2
Separated	1	.7
Educational status:		
Illiterate	1	.7
Primary school certificate	18	13.0
Middle school certificate	34	24.6
High school certificate	31	22.5
Intermediate or post-high school diploma	23	16.7
Graduate or postgraduate	24	7.4
Professional or honours	7	5.1
Occupation		
Unemployed	34	24.6
Professional	24	17.4
Unskilled worker	11	8.0
Semi-skilled worker	8	5.8
Skilled worker	24	17.4
Clerical, shop owner, farmer	24	17.4
Semi-professional	13	9.4
Family		
Nuclear	81	58.7
Extended/joint	57	41.3
Locality		
Urban	58	42.0
Rural	80	58.0

Table 1 shows that out of 138 individuals, 69 are male and 69 are female, 113 are married, 34 completed middle school, 34 are unemployed, 81 are from nuclear families, and 80 are from rural localities.

Table 2:

Shows the frequency and percentage of Comorbidities, Alcohol use, Depression, and Anxiety of Diabetes Mellitus.

	Frequency	Percentage
Comorbidity:		
No Comorbidity	47	34.1
Systemic hypertension	36	26.1
Dyslipidemia	22	15.9
Coronary artery disease	4	2.9
Chronic kidney disease	4	2.9
SHTN with dyslipidemia	16	11.6
SHTN, dyslipidemia, CAD	9	6.5
Alcohol use:		
No alcohol use	98	71.0
Alcohol use	40	29.0
Depression:		
No	102	73.9
Yes	36	26.1
Severity of depression:		
No Depression	102	73.9
Mild depression	17	12.3
Moderate depression	18	13.0
Severe depression	1	.7
Anxiety		
No	105	76.1
Yes	33	23.9
The severity of anxiety:		
No anxiety	105	76.1
Mild anxiety	15	10.9
Moderate anxiety	17	12.3
Severe anxiety	1	.7

From Table 2, it is evident that out of 138 individuals, 47 are with no comorbidity, 98 use alcohol, 102 are with no depression, and 105 are with no anxiety.

Table 3:

Shows the HBA1C control of Depression and Anxiety in Type2 Diabetes patients

HbA1Ccontrol	Depression		Total
	No	Yes	
Yes	25	1	26
No	77	35	112
Total	102	36	138
Anxiety			
Yes	26	0	26
No	79	33	112
Total	105	33	138

From Table 3, 112 have no control over HbA1C, and 77 are with no depression. There are112 have no control over HbA1C, and 79 have no anxiety.

Table 4:

Shows the Comorbid diagnosis in Type 2 Diabetes patients

Comorbidity	Depression		Total
	No	Yes	
No Comorbidity	39	8	47
SHTN	28	8	36
Dyslipidemia	18	4	22
CAD	2	2	4
CKD	1	3	4
SHTN with dyslipidemia	9	7	16
SHT, dyslipidemia, CAD	5	4	9
Total	102	36	138

Table 4 shows that out of 138 participants,47 individuals do not have physical comorbidity, 36 Type 2 diabetes patients have depression, 8 participants do not have any physical comorbidity, and 28 have physical comorbid conditions (DM + SHTN-8, DM + DYS-4, DM+CAD -2, DM+CKD -3, DM+SHTN+DYS -7 and DM+SHTN+DYS+CAD-4).

Table 5:

Shows the Comorbid diagnosis and Anxiety in Type 2 Diabetes patients

Comorbidity	Anxiety		Total
	No	**Yes**	
No Comorbidity	37	10	47
SHTN	30	6	36
Dyslipidemia	18	4	22
CAD	2	2	4
CKD	3	1	4
SHT with dyslipidemia	12	4	16
SHT, dyslipidemia, CAD	3	6	**9**
Total	105	33	138

Table 5 shows that out of 138 participants with Diabetes mellitus type II, 47 had no physical comorbidity, and 91 had physical comorbidity. Out of 33 type 2 diabetes patients who have anxiety, 10 participants do not have any physical comorbidity, and 23 participants have comorbid conditions (DM + SHTN-6, DM + DYS-4, DM+CAD-2, DM+CKD -1, DM+SHTN+DYS -4 and DM+SHTN+DYS+CAD-6).

Table 6:

Correlation between psychological parameters and illness variables

HbA1c			Age of Onset of Illness	Duration Illness	GHQ	HAM -A	HAM -D
HbA1c	Correlation Coefficient	1.000	.541**	.594**	.272**	.410**	**.436****
	Sig. (2-tailed)	.	.001	.001	.001	.001	**.001**
Age of Onset of Illness	Correlation Coefficient	.541**	1.000	.582**	.091	.036	**.060**
	Sig. (2-tailed)	.001	.	.001	.287	.679	**.482**
Duration of Illness	Correlation Coefficient	.594**	.582**	1.000	.120	.147	**.248****
	Sig. (2-tailed)	.000	.001	.	.161	.086	**.003**
GHQ	Correlation Coefficient	.272**	.091	.120	1.000	.388**	**.373****
	Sig. (2-tailed)	.001	.287	.161	.	.001	**.001**
HAM-A	Correlation Coefficient	.410**	.036	.147	.388**	1.000	**.551****
	Sig. (2-tailed)	.001	.679	.086	.001	.	**.001**
HAM-D	Correlation Coefficient	.436**	.060	.248**	.373**	.551**	**1.000**
	Sig. (2-**tailed)**	.001	.482	.003	.001	.001	**.**

Table 6 shows GHQ is significantly correlated with depressive severity (Spearman's coefficient -.373, p-value <0.001**) and anxiety severity (rho-.388, p-value <0.001**). HbA1C has a significant correlation with depressive severity (Spearman's coefficient -.410, p-value <0.001**) and anxiety severity (rho-.436, p-value <0.001**). Duration of illness is significantly correlating with depressive severity (rho-.248, p-value <0.001**).

Discussion:

This research, conducted at a tertiary care hospital, sheds light on the socio-demographic and medical characteristics of individuals with Type II diabetes mellitus, alongside the prevalence and connections of psychiatric comorbidities.

A significant proportion of the participants (66.67%) were aged 50 and above, indicating the prevalence of diabetes among older age groups. Almost all participants (97.1%) were married, emphasizing potential familial support in managing diabetes. Moreover, insights into family structure and rural residence highlight the necessity for culturally sensitive interventions.

Common physical comorbidities such as systemic hypertension, dyslipidemia, coronary artery disease, and chronic kidney disease were observed among Type II diabetes patients, illustrating the multifaceted nature of diabetes-related health challenges [11].

The findings underscore the predictive significance of HbA1c levels in glycemic control and psychiatric morbidity, revealing heightened risks for anxiety and depression among individuals with poorly managed diabetes. Positive associations between diabetes duration, depression, age of onset, and HbA1c levels emphasize the importance of early intervention and ongoing monitoring [12].

This study illuminates the nuanced interplay between socio-demographic factors, physical health conditions, and psychiatric comorbidities among individuals with Type II diabetes. Tailored interventions targeting these factors can enhance disease management and overall patient outcomes. The study highlights the importance of addressing psychosocial factors in diabetes management to improve overall quality of life. Interventions aimed at enhancing coping skills, social support networks, and emotional resilience could significantly benefit individuals living with Type II diabetes. Further research should investigate underlying mechanisms and assess integrated care models for this demographic.

Conclusion:

"Depression and Anxiety" were predominant, and for physical comorbidities, 47 participants were found to have no co-morbidity, and a majority had systemic hypertension (36) and dyslipidemia (22) as physical co-morbidities. This study shows that poor glycemic control is also associated with increased psychiatric co-morbidities.

Limitations:

- Only a small number of subjects (n=138) participated in this study.
- The study was done at a single point in time, which prevents the episodic nature of depression and anxiety symptom evaluation.
- The role of comorbid physical disorder should be studied in detail.
- Since this is a cross-sectional study, only the population residing near this hospital participated.
- A large community-based study including various populations is needed to evaluate depression and anxiety.

Future directions:

Psychological factors assume greater significance with complications and consequences of physical disorders.

Future research should focus on:

- Complications of Diabetes Mellitus interfering with quality of life.
- Affordability for the treatment of the complications.
- Poor drug compliance.
- Family support
- Appropriate care in the later stage of illness.
- A more rigorous study to identify the relationship between glycemic control and psychiatric morbidity.

References

1. Mohan V, Sandeep S, Deepa R, Shah B, Varghese C. Epidemiology of type 2 diabetes: Indian scenario. Indian Journal of Medical Research. 2007;125(3):217-30.
2. Mohan V, Deepa M, Deepa R, Shanthirani CS, Farooq S, Ganesan A, Datta M. Secular trends in the prevalence of diabetes and impaired glucose tolerance in urban South India-the Chennai Urban Rural Epidemiology Study (CURES-17). Diabetologia. 2006 ;49(6):1175-8.
3. Ward M, Druss B. The epidemiology of diabetes in psychotic disorders. Lancet Psychiatry. 2015 ;2(5):431-451.
4. Knol, M. J., Twisk. J. W., Beekman, A. T., Heine, R. J., Snoek. F. J., & Pouwer, F. Depression as a risk factor for the onset of type 2 diabetes mellitus: A meta-analysis. Diabetologia.2006; 49(5):837-845.
5. Gildea EF, McLean VL, Man EB. Oral and intravenous dextrose tolerance curves of patients with manic-depressive psychosis. *Arch Neurol Psychiatry.* 1943; 49:852–859.
6. Kalra, S., Jena, B., & Yeravdekar, R. Emotional and psychological needs of people with diabetes. Indian Journal of Endocrinology and Metabolism.2018;22(5): 696-704.
7. Goldberg, D., & Williams, P. A user's guide to the General Health Questionnaire. Windsor, UK, NFER-Nelson. 1988.
8. Sheehan D et al and Lerubier Y et al. Mini International Neuropsychiatric Interview. English version 5.0.0 DSM IV. 1st July 2006.
9. Hamilton, M. A rating scale for depression. Journal of Neurology, Neurosurgery and Psychiatry. 1960; 23:56–62
10. Hamilton, M. Diagnosis and rating of anxiety. British Journal of Psychiatry.Special publication.1969;3:76-79
11. Das U, Kar N. Prevalence and risk factor of diabetes among the older adults in West Bengal: evidence-based LASI 1st wave. BMC Endocrine Disorders. 2023;23(1):170.
12. Langberg J, Mueller A, Rodriguez de la Vega P, Castro G, Varella M. The Association of Hemoglobin A1c Levels and Depression Among Adults With Diabetes in the United States. Cureus. 2022 Feb 28;14(2):e22688.