Section: Miscellaneous

Original Research Article

ASSESSMENT OF DIABETES DISTRESS AND ITS ASSOCIATED FACTORS AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS ATTENDING AN ENDOCRINOLOGY CENTRE IN SALEM, TAMIL NADU

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ABSTRACT

Background: Diabetes distress (DD) refers to the emotional burden associated with living with and managing diabetes mellitus. It has been linked to poor self-care behaviors, inadequate glycemic control, reduced treatment adherence, and impaired quality of life. Despite the increasing burden of type 2 diabetes mellitus (T2DM) in India, data on diabetes distress among South Indian populations remain limited. **Objectives:** To assess the prevalence of diabetes distress and identify demographic and clinical factors associated with diabetes distress among patients with T2DM. **Materials and Methods:** A hospital-based cross-sectional study was conducted among 253 adults with T2DM attending the Department of Endocrinology at DiaPlus Multispeciality Hospital, Salem, Tamil Nadu. Diabetes distress was assessed using the Diabetes Distress Scale (DDS-17). Sociodemographic and clinical variables were collected using a structured proforma. Descriptive statistics, univariate logistic regression, and multivariable logistic regression analyses were performed. Variables with $p<0.20$ in univariate analysis were entered into the multivariable model. **Results:** The mean age of participants was 52.5±11.9 years and 51.8% were females. Diabetes distress was present in 39.0% of participants. Hypertension, dyslipidemia, obesity, nephropathy, and neuropathy were observed in 48.4%, 35.6%, 46.1%, 16.9%, and 17.6% of participants, respectively. In univariate analysis, age (OR=0.98; 95% CI: 0.96–1.00; p=0.041), hypertension (OR=0.61; 95% CI: 0.37–1.01; p=0.054), and HbA1c (OR=1.18; 95% CI: 1.02–1.37; p=0.028) were associated with diabetes distress. In multivariable analysis, increasing age (AOR=0.97; 95% CI: 0.94–1.00; p=0.041) and higher HbA1c levels (AOR=1.16; 95% CI: 1.00–1.35; p=0.049) remained significant predictors. **Conclusion:** Diabetes distress affected nearly two-fifths of patients with T2DM. Younger age and poor glycemic control were independently associated with diabetes distress. Routine screening and psychosocial support should be integrated into diabetes care.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) has emerged as one of the most significant non-communicable diseases worldwide because of its rapidly increasing prevalence and associated morbidity and mortality. According to the International Diabetes Federation (IDF), an estimated 537 million adults were living with diabetes in 2021, and this number is projected to increase to 643 million by 2030 and 783 million by 2045.[1] India contributes substantially to this global burden, with more than 74 million adults affected by diabetes, making it one of the countries with the highest number of people living with the disease. Rapid urbanization, changing dietary habits, sedentary lifestyles, obesity, and increasing life expectancy have collectively contributed to the growing prevalence of T2DM in India.[1,2]

Diabetes is a lifelong chronic metabolic disorder that requires continuous self-management through medication adherence, dietary modifications, regular physical activity, self-monitoring of blood glucose, and periodic medical follow-up.[2] Unlike many

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chronic illnesses, diabetes demands active patient participation every day. The continuous need for self-care and the fear of acute and chronic complications often place a considerable emotional burden on affected individuals.

Among the psychological challenges experienced by people with diabetes, diabetes distress has gained increasing recognition as a clinically important condition. Diabetes distress refers to the negative emotional experiences that arise specifically from living with and managing diabetes and differs from major depressive disorder because it is directly related to diabetes care and treatment.[3] Diabetes distress includes concerns related to emotional burden, physician-related interactions, regimen adherence, and interpersonal relationships. Persistent diabetes distress may adversely affect patients' ability to perform effective diabetes self-management and may ultimately influence long-term clinical outcomes.[3,4]

Several studies have demonstrated that diabetes distress is associated with poor medication adherence, unhealthy dietary behaviours, inadequate physical activity, reduced self-monitoring of blood glucose, and poor attendance at follow-up visits.[4-6] Consequently, patients with higher levels of diabetes distress often exhibit poorer glycaemic control, higher HbA1c levels, and increased risk of diabetes-related complications.[5-7] The relationship between diabetes distress and glycaemic control is considered bidirectional, whereby poor glycaemic control increases emotional distress while diabetes distress further compromises diabetes self-management.[7]

The Diabetes Distress Scale (DDS-17), developed by Polonsky and colleagues, is one of the most widely accepted instruments for assessing diabetes-specific distress.[4] The scale consists of 17 items distributed across four domains: emotional burden, physician-related distress, regimen-related distress, and interpersonal distress. Each item is scored using a six-point Likert scale, and the overall mean score categorizes patients into no or little distress (score <2.0), moderate distress (2.0–2.9), and high distress (≥3.0). The DDS-17 has demonstrated excellent psychometric properties and has been validated in multiple countries and healthcare settings.[4,8]

International studies have reported that the prevalence of diabetes distress ranges from 18% to 45%, depending on study population, assessment tools, and healthcare settings.[9] In India, although several hospital-based studies have explored diabetes distress, the available evidence remains limited, particularly from South Indian populations. Differences in socioeconomic status, cultural beliefs, educational attainment, family support, healthcare accessibility, and treatment practices may influence both the prevalence and determinants of diabetes distress.[10]

Previous research has identified several demographic and clinical factors associated with diabetes distress. Younger age has consistently been associated with greater emotional burden because younger individuals frequently experience occupational stress, financial responsibilities, family commitments, and concerns regarding long-term diabetes complications.[11] Female gender has also been associated with increased diabetes distress in several studies, although the findings have been inconsistent across populations.[9,11] Similarly, diabetes-related complications including neuropathy, nephropathy, retinopathy, cardiovascular disease, obesity, and poor glycaemic control have been reported to contribute significantly to diabetes distress by increasing disease burden and impairing quality of life.[6,7,12]

Recognition of diabetes distress has become an important component of comprehensive diabetes management because psychological well-being directly influences self-care behaviours and treatment outcomes. Current diabetes management guidelines recommend periodic assessment of diabetes distress using validated instruments such as the DDS-17 and appropriate psychosocial interventions for affected individuals.[2,12] However, diabetes distress remains under-recognized in routine clinical practice, particularly in resource-limited settings.

Considering the increasing burden of T2DM and the limited evidence regarding diabetes distress among South Indian patients, the present study was undertaken to determine the prevalence of diabetes distress and identify demographic and clinical factors associated with diabetes distress among adults with T2DM attending a tertiary care diabetes centre in Salem, Tamil Nadu. The findings are expected to contribute to the growing evidence on diabetes distress and support the integration of psychosocial assessment into routine diabetes care. Hence this study was done with the following objectives

Primary Objective

To determine the prevalence of diabetes distress among adults with Type 2 Diabetes Mellitus attending a tertiary care diabetes centre using the Diabetes Distress Scale (DDS-17).

Secondary Objectives

1. To identify the sociodemographic factors associated with diabetes distress.
2. To determine the association between clinical characteristics, glycaemic control, diabetes-related complications and diabetes distress.
3. To identify independent predictors of diabetes distress using multivariable logistic regression analysis.

MATERIALS AND METHODS

A hospital-based analytical cross-sectional study was conducted among adults with Type 2 Diabetes Mellitus (T2DM) attending the Department of Endocrinology, DiaPlus Multispeciality Hospital, Salem, Tamil Nadu, between March and May 2026. A total of 253 participants were recruited using consecutive sampling.

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Adults aged ≥18 years with a diagnosis of T2DM for at least six months who attended the outpatient department during the study period and provided written informed consent were included. Patients with Type 1 diabetes mellitus, gestational diabetes, major psychiatric illness, cognitive impairment, severe acute illness requiring hospitalization, pregnant women, and those unwilling to participate or with incomplete Diabetes Distress Scale (DDS-17) assessment were excluded.

Data were collected using a structured interviewer-administered questionnaire that included sociodemographic characteristics (age, gender, education, occupation, and marital status) and clinical information, including duration of diabetes, family history, smoking, alcohol use, obesity, hypertension, dyslipidaemia, diabetic complications, blood pressure, HbA1c, serum creatinine, and urinary albumin. Diabetes distress was assessed using the validated 17-item Diabetes Distress Scale (DDS-17) developed by Polonsky et al.[4] Each item is scored on a six-point Likert scale, and the overall mean score was calculated by dividing the total score by 17. Participants were classified as having no or little distress (<2.0), moderate distress (2.0–2.9), or high distress (≥3.0). For regression analysis, moderate and high distress were combined into a single category representing diabetes distress.

Ethical approval was obtained from the Institutional Ethics Committee before commencement of the study. Written informed consent was obtained from all participants, and confidentiality was maintained throughout the study.

Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics version 26.0. Continuous variables were summarized as mean ± standard deviation or median (interquartile range), while categorical variables were expressed as frequencies and percentages. Univariate logistic regression was performed to identify factors associated with diabetes distress. Variables with p <0.20 were included in the multivariable logistic regression model. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated, and p <0.05 was considered statistically significant.

RESULTS

A total of 253 adults with Type 2 Diabetes Mellitus were included in the study. The mean age of the participants was 52.5 ± 11.9 years, with ages ranging from 15 to 80 years. Females constituted 51.8% of the study population. The prevalence of clinically significant diabetes distress (moderate and high distress combined) was 39.0%.

Table 1: Sociodemographic Characteristics of the Study Participants (n = 253) in an Endocrinology centre in Salem, Tamil Nadu

Variable	Category	n (%)
Age (years)	Mean ± SD	52.54 ± 11.93
	Median (IQR)	54 (45–61)
Gender	Male	122 (48.2)
	Female	131 (51.8)
Education	Illiterate	36 (14.2)
	Primary school	10 (4.0)
	Middle school	36 (14.2)
	High school/Higher secondary	68 (26.9)
	Diploma/Bachelor's degree	70 (27.7)
	Professional/Master's degree	33 (13.0)
Occupation	Unemployed	93 (36.9)
	Self-employed	69 (27.4)
	Salaried	67 (26.6)
	Farming	20 (7.9)
	Student	3 (1.2)
Marital Status	Married	245 (96.8)
	Unmarried/Others	8 (3.2)

The study included 253 participants with a mean age of 52.5 ± 11.9 years. Slightly more than half of the participants were females (51.8%). The majority were married (96.8%). Approximately one-fourth of the participants had completed a diploma or bachelor's degree (27.7%), while 26.9% had completed high school or higher secondary education. Illiterates and participants educated up to middle school each constituted 14.2% of the study population. With regard to occupation, over one-third of the participants were unemployed (36.9%), followed by self-employed individuals (27.4%) and salaried employees (26.6%).

Table 2: Clinical Characteristics of the Study Participants (n = 253) in an Endocrinology centre in Salem, Tamil Nadu

Variable	Category	n (%)
Duration of diabetes	<1 year	11 (4.3)
	1–5 years	105 (41.5)
	6–10 years	58 (22.9)
	11–15 years	43 (17.0)
	>15 years	36 (14.2)

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Family history of diabetes	Present	61 (24.1)
	Absent	192 (75.9)
Smoking	Yes	0 (0.0)
	No	253 (100.0)
Alcohol use	Yes	13 (5.1)
	No	240 (94.9)
Obesity	Present	117 (46.2)
	Absent	136 (53.8)
Hypertension	Present	122 (48.2)
	Absent	131 (51.8)
Dyslipidaemia	Present	90 (35.6)
	Absent	163 (64.4)
Retinopathy	Present	17 (6.7)
	Absent	236 (93.3)
Nephropathy	Present	43 (17.0)
	Absent	210 (83.0)
Neuropathy	Present	45 (17.8)
	Absent	208 (82.2)
Cardiovascular disease	Present	12 (4.7)
	Absent	241 (95.3)
Foot complications	Present	15 (5.9)
	Absent	238 (94.1)
Systolic BP (mmHg)	Mean ± SD	128.0 ± 14.6
Diastolic BP (mmHg)	Mean ± SD	80.9 ± 9.3
HbA1c (%)	Mean ± SD	8.4 ± 2.1
Serum creatinine (mg/dL)	Mean ± SD	1.12 ± 0.54
Urinary albumin (mg/L)	Median (IQR)	28 (12–96)
Diabetes distress	No distress	119 (47.0)
	Moderate distress	72 (28.5)
	High distress	4 (1.6)
	No assessment	58 (22.9)

The clinical characteristics of the participants are presented in Table 2. The majority of participants had a duration of diabetes of 1–5 years (41.5%), followed by 6–10 years (22.9%). Hypertension was present in 48.2% of the participants, obesity in 46.2%, and dyslipidaemia in 35.6%. Diabetic nephropathy and neuropathy were present in 17.0% and 17.8% of participants, respectively, whereas retinopathy (6.7%), foot complications (5.9%), and cardiovascular disease (4.7%) were relatively uncommon. The mean systolic blood pressure was 128.0 ± 14.6 mmHg, and the mean diastolic blood pressure was 80.9 ± 9.3 mmHg. The mean HbA1c was 8.4 ± 2.1%, indicating suboptimal glycaemic control. The mean serum creatinine was 1.12 ± 0.54 mg/dL, while the median urinary albumin level was 28 mg/L (IQR: 12–96 mg/L). Among the entire study population, 119 (47.0%) had no diabetes distress, 72 (28.5%) had moderate diabetes distress, 4 (1.6%) had high diabetes distress, and 58 (22.9%) had no complete DDS assessment.

Table 3: Univariate Logistic Regression Analysis for Factors Associated with Diabetes Distress in an Endocrinology centre in Salem, Tamil Nadu

Variable	Crude OR	95% CI	p value
Age	0.98	0.96–1.00	**0.041**
Female sex	1.37	0.80–2.34	0.244
Hypertension	0.61	0.37–1.01	**0.054**
Dyslipidaemia	1.10	0.66–1.85	0.711
Nephropathy	1.09	0.58–2.05	0.790
Neuropathy	1.16	0.62–2.16	0.645
Retinopathy	1.32	0.47–3.67	0.596
Cardiovascular disease	0.88	0.25–3.11	0.845
Alcohol use	1.27	0.36–4.47	0.709
HbA1c (%)	1.18	1.02–1.37	**0.028**

Univariate logistic regression analysis demonstrated that increasing age was significantly associated with lower odds of diabetes distress (OR=0.98; 95% CI: 0.96–1.00; p=0.041). Higher HbA1c levels were significantly associated with increased odds of diabetes distress (OR=1.18; 95% CI: 1.02–1.37; p=0.028). Hypertension showed a borderline significant association with diabetes distress (OR=0.61; 95% CI: 0.37–1.01; p=0.054). Female sex, dyslipidaemia, nephropathy, neuropathy, retinopathy, cardiovascular disease, and alcohol use were not significantly associated with diabetes distress. Based on the predefined criterion of p<0.20, age, hypertension, and HbA1c were included in the multivariable logistic regression model.

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Table 4: Multivariable Logistic Regression Analysis for Factors Associated with Diabetes Distress in an Endocrinology centre in Salem, Tamil Nadu

Variable	Adjusted OR	95% CI	p value
Age	0.97	0.94–1.00	**0.041**
Hypertension	0.61	0.33–1.12	0.108
HbA1c	1.16	1.00–1.35	**0.049**

Variables with a p-value less than 0.20 in the univariate analysis were included in the multivariable logistic regression model. After adjusting for hypertension and HbA1c, increasing age remained independently associated with lower odds of diabetes distress (AOR=0.97; 95% CI: 0.94–1.00; p=0.041). Higher HbA1c levels were independently associated with increased odds of diabetes distress (AOR=1.16; 95% CI: 1.00–1.35; p=0.049), indicating that each 1% increase in HbA1c was associated with a 16% increase in the odds of experiencing diabetes distress. Although hypertension demonstrated lower odds of diabetes distress (AOR=0.61; 95% CI: 0.33–1.12), the association was not statistically significant after adjustment (p=0.108).

DISCUSSION

The present hospital-based analytical cross-sectional study assessed the prevalence of diabetes distress and its associated factors among adults with Type 2 Diabetes Mellitus (T2DM) attending a tertiary care diabetes centre in Salem, Tamil Nadu. Diabetes distress was observed in 39.0% of participants, indicating that nearly two out of every five patients experienced clinically significant emotional distress related to diabetes management. This prevalence is comparable to reports from both Indian and international studies, where diabetes distress has ranged from 18% to 45% depending on the study population and assessment tools used.[9,13] The relatively high prevalence highlights the importance of addressing psychological well-being as an integral component of diabetes care.

The mean age of the participants was 52.5 ± 11.9 years, and females constituted slightly more than half of the study population. Although female participants had higher odds of diabetes distress than males, the association was not statistically significant. Similar observations have been reported in previous studies, suggesting that while women may experience greater emotional burden, other factors such as disease severity and glycaemic control have a stronger influence on diabetes distress.[9,11]

A significant finding of the present study was the inverse association between age and diabetes distress. Increasing age was associated with lower odds of diabetes distress in both univariate and multivariable analyses. Younger patients may experience greater psychological burden because of occupational stress, financial responsibilities, family commitments, and concerns regarding long-term diabetes complications.[11] Older individuals may have better coping mechanisms and greater acceptance of their chronic illness, resulting in lower distress levels.

Higher HbA1c levels were independently associated with diabetes distress. Each one-unit increase in HbA1c increased the odds of diabetes distress by approximately 16%, emphasizing the close relationship between poor glycaemic control and psychological well-being. Similar findings have been reported by Fisher et al. and Gonzalez et al., who demonstrated that diabetes distress adversely affects self-care behaviours, medication adherence, and glycaemic control.[3,6] This bidirectional relationship suggests that addressing psychological distress may improve both emotional health and metabolic outcomes.

Hypertension showed a borderline association with diabetes distress in the univariate analysis but was not independently associated after adjustment. Likewise, dyslipidaemia, nephropathy, neuropathy, retinopathy, cardiovascular disease, and alcohol use were not significantly associated with diabetes distress. Although these complications may increase disease burden, their lack of statistical significance in the present study may be attributable to the relatively small number of affected participants and the cross-sectional design.[12,15]

The findings of this study have important clinical implications. Routine assessment of diabetes distress using validated instruments such as the DDS-17 can facilitate early identification of patients requiring psychological support. Integrating psychosocial care into routine diabetes management may improve treatment adherence, glycaemic control, and overall quality of life. Further multicentre longitudinal studies are required to establish causal relationships and evaluate the long-term impact of interventions aimed at reducing diabetes distress.

CONCLUSION

Diabetes distress was common among adults with Type 2 Diabetes Mellitus, affecting nearly two-fifths of the study participants. Younger age and poor glycaemic control were independent predictors of diabetes distress. Routine screening and appropriate psychosocial interventions should be incorporated into comprehensive diabetes care.

Strengths and Limitations

The study used the validated DDS-17 instrument and evaluated a wide range of demographic and clinical variables using multivariable logistic regression. However, the cross-sectional design limits causal inference, and the single-centre setting may restrict the generalizability of the findings.

Recommendations

Routine screening for diabetes distress should be incorporated into diabetes outpatient services using

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validated tools such as the DDS-17. Particular attention should be given to younger patients and those with poor glycaemic control through appropriate counselling and diabetes self-management education. Future multicentre prospective studies are recommended to evaluate the effectiveness of psychosocial interventions in reducing diabetes distress and improving clinical outcomes.

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