Original Research Article

Prevalence and factors associated with diabetes-related distress among patients with type 2 diabetes mellitus in a South Indian secondary care hospital

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ABSTRACT

Background: Diabetes related distress (DRD), though well known, is under-recognized in the Indian subcontinent. Existing literature is mostly from tertiary or teaching hospitals located in urban areas. The prevalence and determinants of DRD among non-urban settings is not well known. This study aims to fill this knowledge gap by investigating the same among patients with type 2 diabetes mellitus (T2DM) in a South Indian secondary care hospital.
Methods: 227 consecutive patients with T2DM were administered pre-validated diabetes distress scale questionnaire and their responses documented. The prevalence of distress in each of the four domains and as a whole was measured and the association with various factors were identified using appropriate statistical methods.
Results: 165 (72.7%), 164 (72.2%), 176 (77.5%) and 155 (68.3%) of patients experienced emotional distress, physician-related distress, regimen-related distress and interpersonal distress respectively. Overall, 165 (72.7%) had clinically significant diabetes-related distress in the study. Occurrence of hypoglycemic episodes (p 0.02), having high body mass index (BMI) (p 0.03) and non-adherence to a diet plan (p 0.03) were associated with increased distress in various domains.
Conclusions: Three out of four (165/227; 72.7%) adult patients living with T2DM reported experiencing DRD, a significantly higher prevalence than shown in previous studies. This highlights the need to incorporate DRD screening and management as part of routine care of T2DM. Prevalence of DRD was higher among patients who experienced hypoglycemia episodes in the month prior to the assessment. Scrupulous avoidance of hypoglycemia may help to reduce DRD among patients living with T2DM.

Keywords: Diabetes-related distress, Emotional burden, Type 2 diabetes mellitus

INTRODUCTION

Diabetes-related distress (DRD) is a common emotional challenge for patients living with diabetes, impacting their ability to manage the condition. DRD encompasses adverse emotional responses to the diagnosis, risk of complications, self-management challenges, and concerns about support in a patient living with diabetes mellitus.[1] DRD is more common than depression among patients with diabetes, affecting 18 to 38% according to previous studies from India.[2-4] Evidence suggests a link to factors like younger age, lower education, longer diabetes duration, insulin usage, and higher HbA1c levels.[4-6] High DRD levels correlate with poor glycemic control, leading to issues like physical inactivity, dietary non-compliance, and medication non-adherence.[7,8]

The diabetes distress scale-17 (DDS-17) is a well-established scoring system comprising of 17 items to measure the level of distress in patients with diabetes which has been validated in various clinical, geographic and linguistic settings.[2,9-11] It comprises of four domains including emotional burden, physician-related distress, regimen-related distress, and interpersonal distress.

There is limited literature on the prevalence and determinants of diabetes distress, particularly in the Indian subcontinent, in the post-pandemic context. This study aimed to fill this knowledge gap by investigating the prevalence and risk factors associated with diabetes distress among patients in a South Indian secondary care hospital using the pre-validated DDS-17 scale.

METHODS

This cross-sectional study was conducted at a Christian Fellowship Hospital, Oddanchatram, Tamil Nadu, South India located in a semi-urban setting, catering to a socio-economically diverse population. The study recruited adult patients diagnosed with type 2 diabetes mellitus (T2DM) attending both outpatient and inpatient departments by convenience sampling method. Data collection spanned from April 2021 to March 2022. Patients who were terminally ill, with severe systemic illness, co-morbid psychiatric illness, or significant cognitive/visual impairment were excluded. The sample size of 227 was calculated based on a prevalence of diabetes-related distress of 18% for a confidence level of 95% with a margin of error of 5%.[4]

The study was conducted with the approval by the institutional ethics committee after obtaining informed consent from each of the participants. Data were collected using a semi-structured proforma, capturing socio-demographics, medical history, anthropometric measurements, and diabetes-related complications. The diabetes distress scale-17 (DDS-17) was used, a pre-validated 17-item rating scale assessing emotional burden, physician-related distress, regimen-related distress, and interpersonal distress.[2,9-11] The scale, originally in English, was translated to the local language and back translated independently for validation. Each of the 17 items were rated considering the degree to which each of them may have distressed or bothered the patients during the month immediately preceding the reporting. The responses of the patients were recorded using a six-point scale with the following grading: one or two- not a problem, three or four- moderate problem, and five or six suggesting serious problem. Subsequently, the scores pertaining to items in each of the four domains were added and then divided by the number of items in that particular domain. Within each domain, participants with a total score of less than 2.0, between 2.0 and 2.9 and more than or equal to 3.0 were considered to have little or no distress, moderate distress and high distress respectively. Those with moderate or high level of distress were considered together as clinically significant distress. Using this operational definition, the association of various factors with diabetes-related distress was studied.

Collected data were analysed using IBM SPSS software version 15.0 for Windows. Continuous variables were reported as means and medians, while categorical variables were presented as proportions. Associations between diabetes distress and socio-demographic variables were explored using Chi-Square tests and Fischer's exact test. Further, odds ratios (ORs) were calculated to assess the strengths of the associations using logistic regression in SPSS software A p value <0.05 was considered statistically significant. For variables found to have significant association with DRD, a multivariate analysis of variance was done.

RESULTS

This study involved 227 patients with T2DM, assessing various demographics and health parameters. The majority were between 41-70 years the mean age being 54.24±14.31 years (Table 1).

Table 1: Baseline characteristics of the study population.

Characteristics	Out of 227 (%) or mean±SD
Age (years)	54.24±14.31
Male gender	124 (54.6)
Duration of DM (years)	5.51±4.32
BMI (kg/m²)	26.85±4.67
HbA1c (%)	7.82±0.85
Patients who exercise regularly	131 (57.7)
Patients who comply to a diet plan	125 (55.1)
Patients who regularly monitor their blood glucose	126 (55.5)
Patients who comply to prescribed medications and follow up regularly	167 (73.6)
Patients using insulin	46 (20.3)
Retinopathy	21 (10.1)
Neuropathy	62 (27.3)
Nephropathy	46 (20.3)
Any one of the above (retinopathy, neuropathy or nephropathy)	97 (42.7)
Patients who had at least one episode of hypoglycemia in the preceding 1 year	20 (8.8)
Dyslipidemia	79 (34.8)
Hypertension, systemic	102 (44.9)
Ischemic heart disease	56 (24.7)
Cerebrovascular disease	30 (13.2)
Chronic kidney disease	11 (4.8)
Hypothyroidism	38 (16.7)

54.6% were males and 53.7% belonged to the lower middle-class according to the modified Kuppusamy scale. 46.3% had diabetes for less than 5 years with the mean duration of illness in the population being 5.51±4.32 years. The mean body mass index (BMI) was 26.85, with 80.1% categorized as either overweight or obese. Prevalence rates for albuminuria, any grade of diabetic retinopathy and peripheral neuropathy were 20.3%, 10.1% and 27.3% respectively. 42.7% had at least one documented microvascular complication. 20 out of the 227 patients

(8.8%) had at least one episode of hypoglycemia in the preceding year. Additionally, dyslipidemia was found in 34.8%, 44.9% had hypertension, 24.7% had ischemic heart disease, and 13.2% had a history of stroke. Regular

glucose monitoring was reported by 55.5%. 57.7% and 55.1% of patients reported being compliant to a diet and exercise plan respectively. Insulin was used by 20.3%.

Table 2: Prevalence and severity of diabetes-related distress among the study participants as per the response to the DDS-17 questionnaire.

Type of diabetes-related distress	No distress N (%)	Moderate distress N (%)	Severe distress N (%)	Clinically significant distress (moderate or severe) N (%); 95% CI
Emotional distress	62 (27.3)	133 (58.6)	32 (14.1)	165 (72.7); 66.3 - 78.3
Physician-related distress	63 (27.8)	158 (69.6)	6 (2.6)	164 (72.2); 65.9 - 77.9
Regimen-related distress	51 (22.5)	128 (56.4)	48 (21.1)	176 (77.5); 71.4 - 82.7
Inter-personal distress	72 (31.7)	108 (47.6)	47 (20.7)	155 (68.3); 61.7 - 74.2
Total diabetes-related distress	62 (27.3)	148 (65.2)	17 (7.5)	165 (72.7); 66.3 - 78.3

Table 3: Strength of association of various factors with diabetes-related distress among the study population by logistic regression analysis.

Parameter	No DRD (62) (%)	DRD (165) (%)	Odds ratio (95%CI)	P value
General features				
Age >50 years	41 (66.12)	93 (56.36)	0.66 (0.36-1.22)	0.23
Female	27 (45.00)	76 (46.06)	1.04 (0.58-1.89)	1.00
Duration ≥5 years	31 (50.00)	75 (45.45)	0.83 (0.46-1.50)	0.55
BMI ≥25	47 (75.80)	103 (62.42)	0.53 (0.27-1.03)	0.06
HbA1c > 7	50 (80.65)	165 (81.21)	1.04 (0.49-2.18)	1.00
Lifestyle and compliance				
Compliance to a diet plan	38 (61.29)	87 (52.73)	1.42 (0.78-2.58)	0.30
Compliance to regular physical activity	34 (54.84)	97 (58.78)	0.85 (0.47-1.53)	0.65
Regular follow up in clinic	33 (53.23)	92 (55.75)	1.49 (0.78-2.82)	0.24
Regular monitoring of blood glucose	20 (32.26)	40 (24.24)	0.90 (0.50-1.62)	0.77
OAD alone use	46 (74.19)	134 (81.21)	0.67 (0.33-1.33)	0.27
Insulin use	15 (24.19)	31 (18.79)	1.38 (0.69-2.78)	0.36
Complications				
Diabetic retinopathy	5 (8.06)	19 (29.70)	1.48 (0.53-4.16)	0.63
Diabetic peripheral neuropathy	17 (27.42)	46 (27.88)	1.02 (0.53-1.97)	1.00
Diabetic nephropathy	14 (22.58)	33 (20.00)	0.86 (0.42-1.74)	0.71
Hypoglycemia	1 (1.61)	19 (11.51)	7.94 (1.04-60.62)	0.02
Co-morbidities				
Dyslipidemia	23 (38.00)	56 (33.94)	0.87 (0.47-1.60)	0.76
Hypertension	27 (43.55)	76 (46.06)	1.11 (0.62-1.99)	0.77
Ischemic heart disease	13 (20.97)	44 (26.67)	1.37 (0.68-2.77)	0.49
Stroke	9 (14.52)	22 (13.33)	0.96 (0.39-2.09)	0.83
Chronic kidney disease	2 (3.23)	10 (6.06)	1.94 (0.41-9.09)	0.52
Hypothyroidism	11 (17.74)	28 (16.97)	0.95 (0.44-2.04)	1.00

DRD Diabetes-related distress, 95% CI- 95% confidence interval, DRD- Diabetes-related distress, BMI- body mass index, HbA1c- glycated hemoglobin A1c, OAD- oral anti-diabetic drugs.

As per the response to the DDS-17 questionnaire, 72.7% of patients experienced emotional distress. 72.2% had physician-related distress, 77.5% reported regimen-related distress and 68.3% had interpersonal distress. Overall, 72.7% had clinically significant diabetes-related distress in our study. 133 (58.6%) had moderate emotional distress and 32 (14.1%) had severe emotional distress.

Collectively, 72.7% of respondents reported to have some emotional distress related to the disease (Table 2).

On analysis of the individual domains of DRD, 133 (58.6%) had moderate and 32 (14.1%) had severe emotional distress. Thus 165 (72.7%) had clinically significant distress in this domain. Occurrence of

hypoglycemia was the only factor associated with significant emotional distress (OR 8.12 95% CI 1.06-62.03; p value 0.02). 158 (69.6%) reported having moderate and 6 (2.6%) severe physician-related distress amounting to a total of 72.2% of participants. None of the studied factors had an association with physician-related distress. 128 (56.4%) and 48 (21.1%) of the patients reported having moderate and severe regimen related distress respectively, together comprising 77.5% (176 of 227) of the participants. Those who reported non-adherence to any diet plan for diabetes management had significantly higher regimen-related distress (OR 2.17, 95% CI 1.13-4.20; p value 0.03). Similarly, individuals with BMI above 25 and those who had experienced at least one hypoglycemic episode in the preceding month also had significant distress in this area (OR 0.44, 95% CI 0.21-0.92; p value 0.03 and OR 6.21, 95% CI 0.81-47.56; p value =0.05 respectively). A total of 155 (68.3%) participants reported inter-personal distress of which 108 (47.6%) had moderate and 47 (20.7%) had severe degree of distress. The patients who experienced hypoglycemia reportedly experienced significantly more inter-personal distress than others (OR 4.70, 95% CI 1.06-20.82; p value =0.03). On studying overall clinically significant DRD, occurrence of hypoglycemia was the only factor associated with higher DRD (Chi square 5.50; p value 0.02; OR 7.94, 95% CI 1.04-60.62; p value 0.02). However, on multivariate analysis this association was found to be statistically insignificant [F (21,203) =0.88, p 0.15; Wilk's Lambda 0.14; partial eta squared 0.12]. Factors such as age, gender, duration since diagnosis, HbA1c levels, presence of co-morbidities or use of insulin was not significantly associated with DRD among the participants (Table 3).

DISCUSSION

This cross-sectional study, conducted in a South Indian secondary care hospital, explored the prevalence and associated factors of diabetes-related distress among patients with T2DM. Overall, 72.7% of the participants experienced significant DRD. This is significantly higher than documented in previous studies.[2-4] A recent meta-analysis reported prevalence of DRD in T2DM patients in India to be highly variable ranging from 8.45% to 61.48% in their selected studies with a pooled prevalence of 33% (21-45%).[12] This variability was found in studies from other low and mid-income countries.[13] Notably, all the investigators included in the above meta-analysis used the same DDS-17 scale that was utilized in our study. However, almost all of the studies were done in tertiary or teaching hospitals located in urban settings. In this regard, results of our study may indicate the higher prevalence of DRD among patients in non-urban India. It may also be noted that majority of our patients hailed from the lower socio-economic strata. Put together, these factors might explain the higher prevalence of DRD seen in our study. Given the socio-demographics of T2DM in India, it may be important to recognize the higher prevalence of DRD in rural India.

Emotional distress related to diabetes was notable in 72.7% of patients, correlating with occurrence of hypoglycemic episodes. Physician-related distress affected 72.2%, with no significant association to the factors studied. Regimen-related distress was also high (77.5%) and was associated with non-adherence to a diet plan, having high BMI and occurrence of hypoglycemic episodes. A recent Chinese cluster analysis of patients with T2DM and overeweight/obesity had shown regimen-related distress as the most prominent.[14] High BMI may be considered as a red flag indicator for intentionally assessing DRD among patients with diabetes. Adherence to any diabetes diet (and/or exercise) plan correlated negatively with diabetes distress according to a study from Ghana.[15] Interpersonal distress affected 68.3%, with significant association to experiencing hypoglycemia episodes. Notably, experiencing hypoglycemia correlated significantly with emotional, regimen-related and inter-personal distress, emphasizing the impact of this complication on the patients' mental well-being, adherence to treatment regimen and quality of social life. Hypoglycemia significantly contributed to overall DRD also. Multiple studies have highlighted the impact of hypoglycemia, fear of hypoglycemia and impaired awareness of hypoglycemia on DRD among patients with diabetes, both type 1 and type 2.[16-18] It may be prudent to assert that every clinical encounter with a person living with T2DM should actively pursue measures to prevent hypoglycemia and its component stressors. This might not only reduce DRD; but also prevent dangerous physical outcomes in these patients.

Given the substantial prevalence of DRD, it is imperative for healthcare providers to think beyond the HbA1c goals, complications and co-morbidities and screen, assess and address the psychosocial impact of T2DM on patients. Strategies may include diabetes self-management education, peer group support, family and community interventions, digital health support measures etc.[19] At least some of these patients may also need appropriate referral for additional support and follow up.

Limitations of our study include the hospital-based setting and potential bias due to self-reporting nature of the scale used, warranting caution in generalizing findings.

CONCLUSION

Three out of four (72.7%) adult patients living with T2DM reported experiencing DRD, a significantly higher prevalence than shown in previous studies. The psychological impact of T2DM, especially among non-urban populations and lower socio-economic classes in India may be largely under-recognized and under-reported. This highlights the need to incorporate DRD screening and management as part of routine care of T2DM. Those who attempted adherence to a diet plan for diabetes and who were obese had higher risk of regimen-related distress. Prevalence of DRD in total and in three out of four domains of the DDS-17 scale was higher

among patients who experienced hypoglycemic episodes in the month prior to the assessment. Scrupulous avoidance of hypoglycemia using austere pharmacological and lifestyle measures may help to reduce DRD among patients living with T2DM.

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