

Determinants of Diabetes Related Distress Among Type 2 Diabetes Mellitus-A Cross- Sectional Study in a Peripheral Military Hospital in Bangladesh

Islam T¹, Islam² R

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ABSTRACT

Background: Type 2 Diabetes Mellitus (T2DM) is one of the largest contributors to global morbidity and mortality from noncommunicable diseases. The chronic nature of the T2DM, coupled with the demands of its management, often leads to significant psychological stress which is known as diabetes-related distress (DRD). DRD encompasses the emotional burden of living with diabetes, fears about long-term complications, and frustrations related to managing the disease.

Aim: To find out the determinants of DRD among the T2DM patients attending the outpatient department of Combined Military Hospital (CMH) Rajendrapur.

Methods: This cross-sectional study was conducted among 223 previously diagnosed T2DM patients from August 2022 to November 2022 attending at the outpatient department (OPD) of CMH Rajendrapur. Respondents were selected purposively and data collection was done by face-to-face interview using validated 17-items Diabetes Distress Scale (DDS-17).

Results: Among the 223 T2DM patients, 73.1% had no distress, 20.2% had moderate and 6.7% had severe distress with 11.2%, 6.7%, 32.7% and 4% had severe distress in emotional, physician, regimen and interpersonal related distress respectively. Binary logistic regression analysis revealed that having monthly family income <1000-taka (95% CI; 1.042-5.622), performing physical exercise <25 minutes daily (OR 3.200, 95% CI: 1.046 – 9.789) and having dyslipidemia (OR: 3.020, 95% CI: 0.828 – 11.022) were significant predictor for the development of diabetes related distress.

Conclusion: Our study revealed that DRD is prevalent in low-income group patients, not having adequate physical exercise and T2DM patient with dyslipidemia.

Keywords: Type 2 Diabetes Mellitus, Non-communicable diseases, Diabetes distress, CMH

INTRODUCTION

Diabetes Mellitus is one of the largest contributors to global morbidity and mortality from noncommunicable diseases (NCDs).¹

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and relative insulin deficiency, leading to persistent hyperglycemia which is a major public health concern globally.

1. Col Tania Islam, MPH, MPhil Course Member, AFMI, Dhaka Cantonment, 2. Dr Rubaiyat Islam

Correspondence: Colonel Tania Islam, MPH, AFMI, Dhaka Cantonment, Mobile: 01730-068585, E-Mail: taniaislam37@yahoo.com

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Diabetes affects an estimated 537 million adults worldwide between the age of 20 to 79 (10.5% of all adults in this age range) and the vast majority of these cases were T2DM. By 2030, 643 million people will have diabetes globally, increasing to 783 million by 2045.² According to the International Diabetic Federation (IDF) 10th edition, the incidence of diabetes has been rising in South-East Asia (SEA) nations for at least 20 years where rapid urbanization, lifestyle changes, and genetic predispositions have contributed to a sharp rise in prevalence, and current estimates have outperformed all previous forecasts.³ Bangladesh, being one of the densely populated nations is experiencing high prevalence of 12.5% T2DM in 2021 which estimate to increase up to 16% by the year 2045.^{2, 4, 5}

In managing T2DM, patients must adhere to complex and lifelong treatment regimens that include medication, dietary restrictions, and lifestyle modifications. The chronic nature of the disease, coupled with the demands of its management, often leads to significant psychological stress which is known as diabetes-related distress (DRD). DRD is a condition distinct from clinical depression or anxiety, though it is closely associated with both. It encompasses the emotional burden of living with diabetes, fears about long-term complications, and frustrations related to managing the disease.⁶ DRD, a non-psychiatric distress associated with diabetes, can enhance glucose control and self-care if appropriately managed. Having diabetes and the amount of hands-on care it demands causes a great deal of distress for many people. This frequently involves dissatisfaction with the continuous responsibilities of following a diet, exercising, checking blood sugar, and taking medications.⁷ Recent studies indicate that DRD is highly prevalent among individuals with T2DM, with estimates suggesting that up to one-third of

these patients experience moderate to severe distress. This distress is not only detrimental to mental health but also has a direct impact on diabetes management, leading to poorer glycemic control, reduced adherence to treatment, and an increased risk of complications. The prevalence of DRD among T2DM patients is particularly concerning in low-resource settings, where access to comprehensive diabetes care and psychological support may be limited.⁸ The prevalence of DD can vary from 18% to 35% at any given time. According to a longitudinal study, 48% of individuals had significant levels of diabetes distress over the course of 18 months.⁹

Numerous pertinent aspects, such as the diagnosis, disease symptoms and other indicators, have been recognized by researchers and healthcare experts as contributing to DRD. Diabetes-related emotional distress can range from minor psychological issues to ongoing diabetes-related self-care practices like consistent insulin injection, medication administration, blood sugar management, and treatment regimen adherence. Distress can have a major impact on diabetic patients' health outcomes, particularly their ability to manage their condition on their own, according to numerous studies. The results of a qualitative investigation showed that three factors—behavior pressure, emotional pressure, and fear of complications from diabetes—are strongly associated with diabetes discomfort. Furthermore, results from a comprehensive survey conducted in 13 countries revealed that psychological problems, including diabetes distress, are quite common among diabetic patients and can have a substantial impact on their ability to take care of themselves. Patients and healthcare systems are further burdened by diabetes hardship. To enhance the general health of communities, policymakers and healthcare professionals must take the required actions to gain a better understanding of the nature of diabetes distress and its impact on patients' health outcomes.

Many researchers think that adopting self-management behaviors to control diabetes is strongly predicted by diabetic distress and how it is managed.¹⁰

Although there aren't many studies on DRD in Bangladesh, especially in military hospitals, the country's rapidly rising T2DM cases have coincided with an increasing burden of DRD, highlighting the need for integrated care approaches that address both the psychological and physical aspects of diabetes. Priority setting and the development, execution, and assessment of a DRD management intervention program in primary care diabetes care begin with an estimate of these conditions. The purpose of this study was to assess the DRD determinants among type 2 diabetic patients who were seen in the outpatient department of a Bangladeshi military hospital. We intend to use this knowledge to guide the creation of focused interventions that can reduce distress and enhance the overall results of diabetes management by identifying the prevalence and contributing factors of DRD in this population.

MATERIALS AND METHODS

From August 2022 to November 2022, this cross-sectional study was carried out at the outpatient department (OPD) of Combined Military Hospital (CMH) Rajendrapur to determine the factors that contribute to the development of diabetes-related distress (DRD) in patients with T2DM. Purposively selected 223 previously diagnosed T2DM patients were chosen as study population. A pretested questionnaire was used to collect the data through face-to-face interview. The respondents gave their explicit written agreement before any data was collected. Appropriate authority of CMH Rajendrapur gave the ethical clearance for the study. A semi-structured questionnaire including demographic and diabetes-related data was part of the study tool. The T2DM patients' level of distress was measured using

the Diabetes Distress Scale (DDS-17).¹¹ Emotional burden (EB) (five items: 1, 3, 8, 11, 14), physician-related distress (PD) (four items: 2, 4, 9, 15), regimen-related distress (RB) (five items: 5, 6, 10, 12, 16), and diabetes-related interpersonal distress (ID) (three items: 7, 13, 17) make up the scale, which has 17 items and four subscales. The scale was shown to have strong internal consistency reliability and a consistent, generalizable factor structure. Cronbach's α was sufficient for the four subscales (EB = 0.85, PD = 0.71, RD = 0.70, and ID = 0.63) and the main scale (DDS17 = 0.67). The term "emotional burden" refers to feelings of overwhelm, fear, or anxiety related to managing the demands of diabetes over time; "routine distress" refers to feelings of failure due to poor diabetes management, such as meal plans, exercise, etc.; "interpersonal distress" refers to feelings of not receiving enough support for their diabetes from friends and family; and "physician distress" refers to concerns about health care and getting enough knowledge, assistance, and guidance from medical professionals. A six-point Likert scale was used to rate each issue, with 1 denoting no difficulty and 6 denoting a very serious problem. The average answers on the 1-6 scale for each of the 17 items are used to calculate the scale's overall distress score. Additionally, depending on the average response on the 1-6 scale for each item in that scale, the scale generates a score for each of the four subscales. In order to identify the subscale with the highest reported level of distress and to discuss more specific areas of concern regarding patients with type 2 diabetes, the total score is used as a starting point for a conversation about the patient's overall level of diabetes distress and current general feelings about managing diabetes. Averaging the scores of 17 items yields the total DDS-17 score. The scores of the items in each of the four domains are averaged to produce the score for that domain. A score of

less than 2 suggests little or no distress, a value between 2 to 2.9 indicates moderate discomfort, and a score of > 3 indicates extreme distress for the entire DDSs or any one area.¹¹⁻¹² Version 23 of the Statistical Package for Social Sciences (SPSS) was used for data processing and analysis. Descriptive data included mean, standard deviation (SD), percentage, and frequency. To determine the factors that contribute to diabetes-related distress in T2DM patients, binary logistic regression was used. A statistically significant result was defined as a two-tailed $p < .05$.

RESULTS

Selection of the respondents

Irrespective of age, sex and service status, out of 337 T2DM patients registered at the OPD of CMH Rajendrapur, 286 used to report to the OPD regularly for their regular health checkup and anti-diabetic medicine whom were invited to participate in the study. Of the 286 patients 18 were severely ill with comorbidity, 23 refused to participate because of their busy schedule, 13 had incomplete data and 9 were unwilling to participate in the interview (Figure-1)

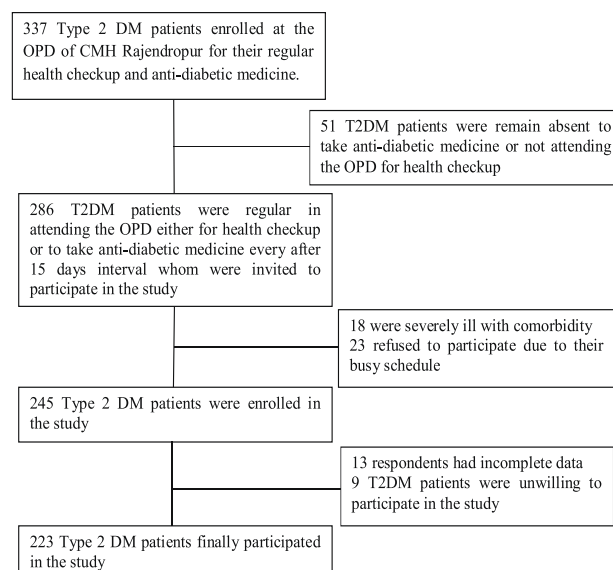


Figure-1: Flow chart of study participants

Sociodemographic characteristics of the respondents

Majority (55.6%) were male with an average (SD) age of 48.9 (12.7) years, highest (38.6%) were qualified up to class eight level education whom were mostly retired (32.3%) and house wife (43.9%). Respondents were predominantly (94.6%) married with an average (SD) monthly family income of 21041 (14631.02) taka. Majority (61.4%) belonged to nuclear family with 56.5% were rural inhabitant (Table-1)

Diabetes related attributes of the respondents

Average (SD) age of onset of T2DM was 42.41 (10.85) years with an average duration of disease was 6.50 (5.39) years. Almost four-fifth (79.4%) of the respondents were diagnosed as a case of T2DM at government hospital and 36.3% had symptoms of DM during diagnosis. Sixty percent of the respondents took the treatment of DM regularly and 78% of them were on oral hypoglycemic agents. Among the respondents, 49.8% used to took part physical exercise between 26-40 minutes with an average (SD) duration of 32.87 (12.98) minutes. Highest (45.1%) comorbidity among the respondents were hypertension which was followed by dyslipidemia and more importantly 35.9% had no comorbidity and 65.9% had no diabetes related complication as well (Table-2).

Diabetes related distress among the respondents

In regards to the total diabetes related distress, 73.1% had no distress, 20.2% had moderate and 6.7% had severe distress. In case of emotional related distress, it was equally 11.2% respondents had moderate and severe distress

whereas only 6.7% had physician related severe distress. Almost 32.7% had regimen related severe distress and only 4% respondents had interpersonal related severe distress (Figure-2 and Table-3)

Determinants of diabetes related distress among the respondents

Results of binary logistic regression analysis of factors associated with diabetes related distress among the T2DM patients are presented in Table 4. It was revealed that, odds for diabetes related distress were 2.420 (95% CI; 1.042-5.622) times significantly higher for the respondents having monthly family income <10000 taka as compared to higher income group. It was also revealed that T2DM patients performing physical exercise <25 minutes daily and having dyslipidemia were significant predictor for the development of diabetes related distress (OR 3.200, 95% CI: 1.046 – 9.789) and (OR: 3.020, 95% CI: 0.828 – 11.022) respectively. Age group <40 years (OR: 0.153, 95% CI: 0.052 – 0.448), married respondents (OR: 0.222, 95% CI: 0.058 – 0.845), residing in a pucca house (OR: 0.521, 95% CI: 0.266 – 1.022), having duration of diabetes for <3 years (OR: 0.279, 95% CI: 0.113 – 0.689), diagnosed as a case of diabetes incidentally (OR: 0.390, 95% CI: 0.154 – 0.991), with symptoms of diabetes (OR: 0.340, 95% CI: 0.129 – 0.896) and having hypertension as a comorbidity (OR: 0.318, 95% CI: 0.127 – 0.800) in contrast to the other groups of the variables was protective factor for the development of diabetes related distress (Table-4).

TABLE-I: Socio demographic Characteristics of the respondents (n=223)

Attributes	Frequency (%)	Attributes	Frequency (%)
Gender		Type of family	
Male	124 (55.6)	Nuclear	137 (61.4)
Female	99 (44.4)	Joint	86 (38.6)
Age group in years		Family member group	
<40	68 (30.5)	<4	101 (45.3)
41-55	88 (39.5)	>5	122 (54.7)
>56	67 (30.0)	Mean (SD)	5.04 (±1.70)
Mean (±SD)	48.90 (±12.70)	Place of residence	
Educational Qualification		Urban	47 (21.1)
Up to class eight	86 (38.6)	Rural	126 (56.5)
SSC	78 (35.0)	Sub-urban	50 (22.4)
HSC and above	59 (26.4)	Type of residence	
Marital status		Pucca	109 (48.9)
Married	211 (94.6)	Semi-pucca	114 (51.1)
Widow/widower	12 (5.4)	Smoking habit	
Occupation		Non-smoker	166 (74.4)
Govt. service	53 (23.8)	Ex-smoker	35 (15.7)
Retired	72 (32.3)	Smoker	22 (9.9)
House Wife	98 (43.9)	Body mass index	
Monthly family income in taka		Normal	117 (52.5)
<10000	80 (35.9)	Over weight	106 (47.5)
10001-25000	65 (29.1)		
>25001	78 (35.0)		
Mean (±SD)	21041 (±14631.02)		

TABLE-II: Diabetes related attributes of the respondents (n=223)

Attributes	Frequency (%)	Attributes	Frequency (%)
Age of onset of DM (years)		Type of current treatment of DM	
<35	61 (27.4)	Oral Hypoglycemic Agents (OHA)	174 (78.0)
36-45	73 (32.7)	OHA and insulin	49 (22.0)
>46	89 (39.9)	Nature of DM treatment	
Mean (±SD)	42.41 (±10.85)	Regular	135 (60.5)
		Irregular	88 (39.5)
Duration of DM (years)		Duration of physical exercise in minutes	
<3	86 (38.6)	<25	69 (30.9)
4-7	59 (26.5)	26-40	111 (49.8)
>8	78 (35.0)	>41	43 (19.3)
Means (±SD)	6.50 (±5.39)	Mean (SD)	32.87 (12.98)
		Comorbidity with DM	
Place of first diagnosis of DM		Hypertension	103 (45.1)
Govt Hospital	177 (79.4)	Ischemic heart disease (IHD)	13 (5.8)
Private Hospital	46 (20.6)	Dyslipidemia	30 (13.5)
Mode of diagnosis of DM		No comorbidity	80 (35.9)
Incidentally	80 (35.9)	Diabetes related complications	
Symptoms of DM	81 (36.3)	Retinopathy	29 (13.0)
Routine checkup	62 (27.8)	Nephropathy	24 (10.8)
Place of first treatment of DM		Neuropathy	12 (5.4)
Govt. hospital	182 (81.6)	Diabetic foot	11 (4.9)
Private hospital	41 (18.4)	No complications	147 (65.9)

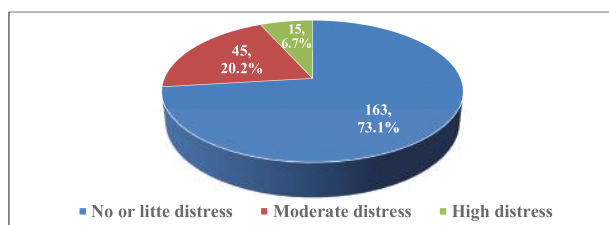


Figure-2: Distribution of level of distress among the respondents (n=223)

TABLE-III: Domain wise distribution of diabetes related distress (n=223)

Domain of Distress	Level of Diabetes related distress n (%)		
	No distress	Moderate distress	High distress
Emotional related distress	173 (77.6)	25 (11.2)	25 (11.2)
Physician related distress	163 (73.1)	45 (20.2)	15 (6.7)
Regimen related distress	53 (23.8)	97 (43.5)	73 (32.7)
Interpersonal distress	203 (91.0)	11 (4.9)	09 (4.0)
Total diabetes related distress	163 (73.1)	45 (20.2)	15 (6.7)

TABLE-IV: Logistic regression results for the factors associated with Diabetes related distress

Attributes	B	SE	p	OR	95% C.I. for OR	
					Lower	Upper
Sex						
Male	-.229	.379	.546	.795	.379	1.671
Female (RC)						
Age group in years						
<40	-1.876	.548	.001*	.153	.052	.448
41-55	-.422	.358	.238	.655	.325	1.321
>56 (RC)						
Marital status						
Married	-1.505	.682	.027*	.222	.058	.845
Widow/widower (RC)						
Occupation						
Service	.497	.423	.239	1.644	.718	3.764
Retired	-.071	.396	.857	.931	.429	2.023
House wife (RC)						
Monthly income in taka						
<10000	.884	.430	.040*	2.420	1.042	5.622
10001-25000	.011	.451	.981	1.011	.418	2.445
>25001 (RC)						
Type of family						
Nuclear	.024	.406	.952	1.025	.463	2.269
Joint (RC)						
Number of family members						
<4	-.882	.421	.036	.414	.181	.946
>5 (RC)						
Type of residence						
Pucca	-.652	.344	.050*	.521	.266	1.022
Semi-pucca						
Age of onset of DM						
<35	-.382	.531	.472	.682	.241	1.931
26-45	-.012	.416	.976	.988	.437	2.230
>46 (RC)						
Duration of DM in years						
<3	-1.278	.462	.006*	.279	.113	.689
4-7	-.311	.429	.468	.733	.316	1.699
>7 (RC)						
Mode of diagnosis of DM						
Incidentally	-.942	.476	.048*	.390	.154	.991
Symptoms of DM	-1.077	.494	.029*	.340	.129	.896
Routine examination (RC)						
Types of current treatment of DM						
Oral hypoglycemic agent	.093	.442	.833	1.098	.462	2.610
Combination (RC)						
Duration of regular physical exercise in minutes						
<25	1.163	.570	.041*	3.200	1.046	9.789
26-40	.247	.528	.641	1.280	.454	3.604
>41 (RC)						
Regularity of taking treatment of DM						
Yes	-.651	.414	.116	.521	.232	1.173
No (RC)						
Comorbidity with DM						
Hypertension	-1.144	.470	.015*	.318	.127	.800
Dyslipidemia	1.105	.661	.050*	3.020	.828	11.022
Ischemic heart disease	-.014	.505	.978	.986	.366	2.655
No comorbidity (RC)						

RC= Reference category

DISCUSSION

We conducted this cross-sectional study with an aim to find out the determinants for the development of DRD among T2DM patients. For that we selected a primary care health setting of Bangladesh armed forces which is a 25 bedded non-dietary hospital having limited OPD services. Both active and former military people, as well as their families, used to receive T2DM therapy and consultations at this OPD. As a result, the respondents' sociodemographic traits were generally in line with the current policies and procedures of the Bangladeshi military, but they frequently deviated from the national norm.

According to our study, the majority of respondents were male, with an average (SD) age of 48.9 (12.7) years. The biggest percentage of respondents (38.6%) had completed class eight education, and the majority were housewives (43.9%) and retired (32.3%). The majority of respondents (94.6%) were married, 61.4% were part of a nuclear family, and 56.5% lived in a rural area. The results of the study by Adugnew M, et al,¹³ Kamrul-Hasan AB, et al,¹⁴ and Zhou H, et al,¹⁵ is nearly identical. Our results differ from those of Tunsuchart K. et al.¹⁶ in terms of the mean age and sex of the respondents, which could be because of regional variation, study design, and participant selection.

The mean ($\pm$ SD) duration of type 2 diabetes in our sample was 6.50 ($\pm$ 5.39) years, which is nearly identical to the results of studies by Aschner P et al,¹⁷ and Alajmani DS et al.¹⁸ Our study found that 25.6% of participants were treated with insulin and oral hypoglycemic agents, which differs from the findings of Alajmani DS et al.¹⁸ This could be because of regional differences, treatment regimens, responder selection, and study design.

We found that among the respondents, hypertension is a prevalent comorbidity

(45.1%), which is in line with the findings of the study by Aschner P et al,²² but not the same as the findings of the studies by Einstein A et al.,²⁰ and Alajmani DS et al.¹⁸

Our study found that 26.9% of respondents had moderate to severe DRD, which is lower than the study findings in Bangladesh (48.5%) but nearly comparable to the studies in China (29.6%) by Huynh G et al,¹⁹ India (24.9%) by Ratnesh-Shivaprasad KS et al,²⁰ and Saudi Arabia (Aljuaid MO et al,²¹).²² Ethiopia (53.9%),¹³ Ghana (44.7%), China (43.0%).^{15, 23} The United States (51.3%),⁹ Canada (39.0%),²⁴ and Malaysia (49.2%).²⁵ This finding makes it clear that the DRD differs significantly among nations (and even within a single nation) and healthcare environments, and that it differs in terms of demographics, clinical features, and cultural backgrounds in every geographic area. This discrepancy could potentially result from the use of various DRD measurement instruments, lesser educational attainment, subpar diabetic care services, a dearth of DRD screening programs, and other stressors. The sample selection and study methodology may also be contributing factors to the discrepancy.

According to our research, the two DDS subscales with the highest levels of distress are regimen (80.2%) and physician (26.9%). This finding is comparable to the research done by Aljuaid MO et al.²¹ on physician-related distress and Huynh G et al,¹⁹ on regimen-related distress. Additionally, we discovered that younger participants had higher DRDs across all three domains (total of distress, regimen-related, and emotional). Wardian J. et al. also reported this finding.²⁶ It may be because younger individuals have to manage the time and expense of diabetes, which can be high and chronic, while also taking care of their families, jobs, and finances, which contributes to their high levels of anguish.

According to our study, there is a considerably ($p < 0.05$) lower risk of developing DRD the shorter the duration of T2DM (< 3 years) (OR: 0.279, 95% CI: 0.113 – 0.689). Long-term diabetes has been demonstrated to have a psychological impact on a patient's quality of life; that is, the longer the diabetes has been present, the higher the chance of depression.^{27,28} Similar findings were also published, demonstrating that long-term diabetes might cause distress directly or indirectly.^{9, 29, 30}

Similar to the study of Kamrul-Hasan AB, et al., which found that DRD is more common in respondents in higher age groups, our study likewise showed that patients in lower age groups are considerably protected against the development of DRD14. However, this result differs from the research done by Hemavathi P. et al.

Respondents who previously engaged in less physical activity (less than 25 minutes) had a significantly ($p < 0.05$) three-fold increased risk of developing DRD, which is consistent with research findings by Adungnew M. et al.¹³ Our research also showed that dyslipidemic T2DM patients had a threefold increased risk of developing DRD, which is consistent with the findings of a study by Adungnew M. et al.¹³

This study has a number of advantages. To the best of our knowledge, it was the first study to identify the factors that contribute to DRD in T2DM patients in a peripheral CMH's outpatient department. Since the researcher obtained the data directly from the patients, it has excellent quality control. Another positive was the enormous sample size and the fact that all respondents were included, regardless of their age, sex, or service status. Nevertheless, our study has a number of drawbacks. The first is a lack of generalizability because the data was gathered from a 25-bed hospital's outpatient department, which does not ensure

representativeness. Its susceptibility to recollection bias comes in second. This is due to the fact that data was entirely dependent on participant responses. Third, this study was cross-sectional and could only assess the DRD determinants among T2DM patients without the respondents' longitudinal observations. It also was unable to provide any concrete insight into cause-and-effect relationships or temporal associations. Fourth, it would be better to choose the sample by simple random sampling, which was inappropriate in this case. Finally, because the respondents were chosen for the study on purpose, there may be a chance of selection bias.

CONCLUSION

The study found that most T2DM patients were middle-aged males from rural, nuclear families with low income and education levels. While the majority had no diabetes-related distress, some experienced moderate to severe distress, especially related to emotional and treatment regimens. Low income, lack of physical activity, and dyslipidemia were key risk factors, while younger age, being married, shorter disease duration, and having hypertension were protective. Addressing these factors is essential for improving diabetes care and reducing distress.

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Conflicts of interest

The authors declare that they have no conflict of interest.

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