

Assessment of diabetes-related distress among type 2 diabetic patients, Riyadh, Saudi Arabia

Abdullah Aedh AlOtaibi¹, Mohammed Almesned²,
Turki Mohammed Alahaideb¹, Saad Mohammed Almasari¹,
Saleh Saad Alsuwayt¹

¹Family Medicine Physicians, Academy of Family Medicine, King Saud Medical City, Riyadh, ²Head Department of Family Medicine, King Saud Medical City, Riyadh, Saudi Arabia

ABSTRACT

Objectives: To assess the prevalence of diabetes-related distress (DRD) among Type 2 diabetics in the diabetic center of King Salman Hospital, Riyadh, Saudi Arabia. **Methods:** This was an observational descriptive study conducted between December 2019 and January 2020 among T2DM patients followed up at the diabetic clinics of the Diabetic Center of King Salman Hospital in Riyadh, Saudi Arabia. We used the 17-items Diabetes Distress Scale (DDS17) to measure DRD. **Results:** A total of 399 T2DM patients were included in the study, 58.4% were males. High distress was seen in 40 patients. Multivariate analysis showed that longer duration of diabetes (>15 years), female gender, longer intervals in-between visits (>6 months), and experience of episodes of severe hypoglycemia as the most significant factors related to higher levels of distress. The patients who were diabetics longer than 15 years had an increased risk for high distress by 3.6 times, infrequent clinic visits (longer than 6 months) increased the risk for high distress by 5.3 times, and patients who experienced severe hypoglycemia had an increased risk for high distress by 5.8 times. **Conclusion:** This study showed a high (35.6%) prevalence of moderate to severe DRD. Long-standing diabetes, a longer interval of a clinic visit, and severe hypoglycemia increase the risk for DRD by 3.6, 5.3, and 5.8 folds. Health care providers should focus on reducing DRD and devise ways to increase self-care practices and coping skills.

Keywords: Assessment, diabetes mellitus, distress, Saudi Arabia, type 2 diabetes

Introduction

Diabetes Mellitus (DM) is a complex, chronic illness requiring continuous medical care with multifactorial risk-reduction strategies beyond glycemic control.^[1,2] Globally, the prevalence is expected to further increase to 9.9% that reflects a population of 628.6 million people by the year 2045.^[2] However, the country-specific age-standardized prevalence of Type 2

DM (T2DM) decreased in 9 countries but increased significantly in 119 countries including Saudi Arabia.^[3]

The Kingdom of Saudi Arabia (KSA) ranks first among Arab world countries with the highest prevalence of T2DM at (31.6%) followed by Oman (29%), Kuwait (25.4%), Bahrain (25.0%), and the United Arab Emirates at (25.0%).^[4] KSA ranks 7th in the world with over one-fifth of its population suffering from the disease.^[5,6] Apart from this, DM caused a lot of health expenditure accounting for 43% of the total medical cost in the USA and 80% in the United Kingdom.^[7] The multimodal intervention in diabetes in frailty (MID-FRAIL) intervention (clinical targets, physical activity plus nutritional education) reported that this

Address for correspondence: Dr. Abdullah Aedh AlOtaibi, Resident, Academy of Family Medicine (AFM-KSMC), King Saud Medical City, P. O. Box - 11449, Riyadh - 37877, Saudi Arabia.
E-mail: a.a.otaibi13@gmail.com

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multimodal intervention saved costs to the health care system and achieved favorable health gains.^[8] In Saudi Arabia, 90% of health services and its expenditure provided to diabetic citizens cost around 17 billion Riyals and was projected to increase to 43 billion Riyals in the coming years.^[9]

Diabetes-related distress (DRD), also known as diabetes-specific distress, is the emotional response to living with diabetes, the burden of relentless daily self-management, and (the prospect of) its long-term complications.^[10] It is associated with lower levels of self-care and general emotional wellbeing.^[11] It can vary by diabetes type, insulin treatment, social consequences, food restriction, and obesity.^[12,13] If left untreated, mild diabetes distress may develop into severe diabetes distress and/or depression.^[14] It can also lead to adverse medical and psychological outcomes, including reduced physical activity, less healthy eating, not taking medication as recommended, less frequent self-monitoring of blood glucose, elevated HbA1c, more frequent severe hypoglycemia, and impaired quality of life.^[15-20] The accumulation of these problems and frustrations may lead to “diabetes burnout” and disengagement from diabetes care.^[14,21]

Studies have shown the association between depression and diabetes complications and mortality.^[22,23] Over 80% of T2DM patients with moderate or high DRD are not clinically depressed and that, among those who are clinically depressed, many of the depressive symptoms reported are related to diabetes.^[24] DRD was found to be significantly associated with HbA1c, and increased HbA1c was related to emotional functioning.^[25,26] Studies showed that 8.9% of outpatients with diabetes have high DRD, which was associated with higher HbA1c and among elderly people.^[26] In a German study, only 1.2% of outpatients on primary care level showed high DRD.^[27] In China, DRD was comparatively higher at 42%, with the regimen distress (RD) scoring the highest of the domains, interpersonal distress (ID) scored the lowest, and less sleep time of 6.5 h was significantly related to a higher DRD.^[28] On the contrary, two Malaysian studies showed a high prevalence of DRD, but no associations were noted between DRD and HbA1c, blood pressure or lipids, and emotional burden, physician-related distress, regimen-related distress, and internal distress.^[29,30] An Indian study showed an even higher prevalence of moderate to high DRD (77.5%), with women having higher DRD than men.^[29,31] Increasing age was also reported to be directly related to increased DRD.^[30,31] The emotional burden domain was considered the most important domain in measuring diabetes distress and was found to be significantly correlated with duration, glycemic control, treatment modalities, diabetic complications, smoking, and BMI.^[32]

A single study from AlTaif City in Saudi Arabia reported a DRD prevalence of 25%.^[33] This study used the Diabetes Distress Scale-17 items (DDS-17) and found out that the ED component was the most prevalent followed by physician-related distress. Furthermore, they also reported that HbA1c was significantly higher among those with high combined distress and high

emotional distress compared to those with mild/moderate distress and was significantly correlated with triglyceride levels, BMI, T2D duration, and the interval between visits.^[31] In this regard, we conducted this study to assess DRD among T2DM patients in our institution and confirm the findings of the previous study conducted in Saudi Arabia.

Methods

This was an observational descriptive study conducted between December 2019 and January 2020 among T2DM patients who were seen and followed up at the diabetic clinics of the Diabetic Center, King Salman Hospital in Riyadh, Saudi Arabia. Patients who were at least 18 years old, and had all recent laboratory results were included in the study. Patients with T1DM, and those who had untreated hypothyroidism, gestational diabetes, cancer, mental retardation, and psychiatric illness, were excluded from the study. The Institutional Review Board of King Fahad Medical City in Riyadh, Saudi Arabia approved the conduct of the study. The Institutional Review Board of King Fahad Medical City in Riyadh, Saudi Arabia approved the conduct of the study (IRB 00010471-FWA00018774). The ethical approval was obtained on 5 December 2019.

The sample size was calculated using a 20,000 expected maximal number of population, and with a 5% margin of error and 95% confidence level. The calculated sample size was 377 T2DM patients (convenience sampling technique was used without randomization). Data collection was done using a Diabetes Distress - Screening Scale (DDS17) to assess the DRD, which was translated to the Arabic language taken from a previous study.^[34] Validation was performed with a high Cronbach's alpha of 0.95.

The questionnaire included questions on sociodemographic data (age, gender, marital, literacy, occupation, and income), lifestyle (smoking, exercise, and sleep time), medical and diabetic status (duration, drugs, complications, visits interval, and associated diseases), vitals (blood pressure, height, weight, and body mass index), laboratory values (HA1c and lipid profile), and the DDS17 items of diabetes distress scale. The questionnaire was administered through an interview by the researchers after the patient consented to participate in the study. Each item of the DDS17 tool was scored on a Likert scale from 1 (no distress) to 6 (serious distress) concerning distress experienced over the last month. The scale components included four reliable subscales via item mean scores: emotional burden, physician-related distress, regimen-related distress, and interpersonal distress. The total score of DDS-17 was calculated by summing the 17 items' results and dividing them by 17. The scores were classified regarding the severity into the following: <2.0 as little or no distress (not significant), 2.0 to 2.9 as moderate distress, and ≥ 3.0 as high distress.^[35,36]

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 23.0 (SPSS Inc., IBM, Armonk, New York, USA). The data were reported as continuous variables.

Table 1: Sociodemographic, anthropometric and laboratory profile of 399 T2DM patients

Sociodemographic variables	n (%)
Gender	
Males	233 (58.4)
Females	166 (41.6)
Age groups	
20-40 years old	54 (13.5)
40-60 years old	243 (60.9)
>60 years old	102 (25.6)
Marital status	
Single	25 (6.3)
Married	307 (76.9)
Divorced	36 (9.0)
Widow	31 (7.8)
Educational levels	
Illiterate	86 (21.6)
High school or less	227 (56.9)
Postgraduate	86 (21.6)
Family monthly income, in SAR	
<5000	196 (49.1)
5000-15000	178 (44.6)
>15000	25 (6.3)
Employment	
Unemployed	156 (39.1)
Retired	109 (27.3)
Employed	134 (33.6)
Smoking	
Non-smoker	289 (72.4)
Former smoker	34 (8.5)
Current smoker	76 (19.0)
Physical activity, in min/week	
<150 h	265 (66.4)
130-300 h	116 (29.1)
>300 h	18 (4.5)
Sleep duration, in h/day	
<6 h	154 (38.6)
6-8 h	203 (50.9)
>8 h	42 (10.5)
Duration of diabetes, in years	
<5 years	137 (34.3)
5-10 years	145 (36.3)
10-15 years	61 (15.3)
>15 years	56 (14.0)
Treatment regimen	
Oral hypoglycemic only	203 (50.9)
Insulin only	79 (19.8)
Oral hypoglycemic + insulin	95 (23.8)
Lifestyle modification	22 (5.5)
Interval between visits, in months	
<3 months	93 (23.3)
3-6 months	251 (62.9)
>6 months	55 (13.8)
Presence of diabetic complications	157 (39.3)
Comorbid conditions/complications	
Cerebrovascular accident	10 (2.5)
Ischemic heart disease	10 (2.5)
Peripheral vascular disease	2 (0.5)
Retinopathy	92 (23.1)
Nephropathy	17 (4.3)
Neuropathy	79 (19.8)
Hospital admissions	20 (5.0)

Contd...

Table 1: Contd...

Sociodemographic variables	n (%)
Severe hypoglycemia	31 (7.8)
Hypertension	137 (34.3)
Dyslipidemia	169 (42.3)
Obesity	183 (45.3)
Anthropometric and laboratory results	Mean (SD)
SBP, in mm Hg	137.7 (19.3)
DBP, in mm Hg	81.4 (13.6)
Weight, in kg	81.3 (15.1)
Height, in cm	163.7 (9.3)
BMI, in kg/m ²	30.6 (6.7)
Triglyceride	1.7 (1.3)
LDL	2.5 (0.9)
HDL	1.4 (0.7)
Total cholesterol	4.4 (1.1)

The results were expressed as mean and standard deviation. An independent *t*-test was performed to determine significant differences between means. Pearson correlation was done to determine the correlation between variables. A *P* value of ≤ 0.05 was considered statistically significant.

Results

A total of 399 T2DM patients were included in the study, 233 (58.4%) males and 166 (41.6%) females, the majority were aged 40 to 60 years old ($n = 243, 60.9\%$). Table 1 shows the detailed sociodemographic, anthropometric, and laboratory results for all patients characteristics of all patients. There were 85 patients (21.3%) with HbA1c levels of <7 , 117 (29.3%) with HbA1c of 7–8, and 197 patients (49.4%) had an HbA1c of >8 [Figure 1].

The mean (SD) of the four scale components are shown in Table 2. The highest of the four scale components was the regimen-related distress score (2.0 ± 0.8), followed by emotional distress (1.9 ± 0.9), physician-related distress (1.8 ± 1.5), and the lowest was interpersonal distress (1.8 ± 1.0). The mean total distress score was 1.9 ± 0.8 . There were 40 patients (10.0%) with high distress, 102 (25.6%) with moderate distress, and 257 (64.4%) with little or no distress [Figure 2].

There was a significantly higher percentage of females who had high distress compared to males (15.1% vs. 6.4%, $P = 0.016$). The patients who had a shorter duration of sleep (<6 h) significantly experienced higher distress compared to patients who had 6–8 h and >8 h of sleep (12.3% vs. 8.9% vs. 7.1%, $P = 0.001$). There were significantly more patients who had a longer duration of diabetes (>15 years) who had higher distress levels compared to patients who had a shorter duration of diabetes ($P = 0.001$). There were significantly more patients who were on insulin and a combination of insulin and oral hypoglycemic agent (OHA) who had higher distress levels than their counterparts ($P = 0.004$). The patients who less frequently visit the clinic (>6 months) had higher distress levels ($P = 0.008$). There were significantly more

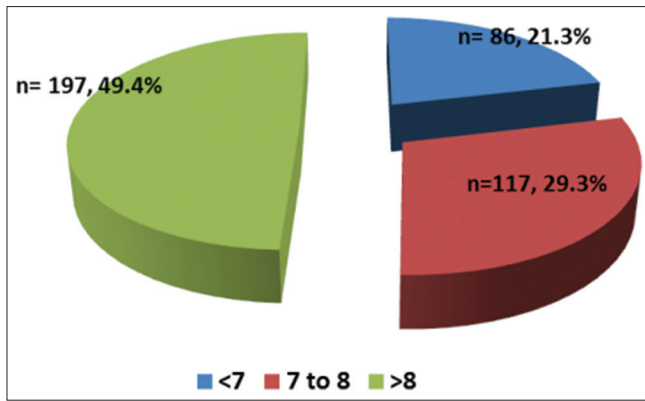


Figure 1: HbA1c levels in 399 T2DM patients

DDS17 scale components and total score	Mean (SD)
Emotional distress score	1.9 (0.9)
Physician-related distress score	1.9 (1.5)
Regimen-related distress score	2.0 (0.8)
Interpersonal distress score	1.8 (1.0)
Total distress score	1.9 (0.8)

patients who had retinopathy, severe hypoglycemia, hypertension, and dyslipidemia who had higher distress levels ($P = 0.002$, $P = 0.003$, $P = 0.020$, $P = 0.035$, respectively [Table 3].

Pearson correlation test revealed that the emotional distress score was significantly correlated with marital status ($r = 0.307$, $P < 0.001$), educational level ($r = -0.367$, $P < 0.001$), income level ($r = -0.117$, $P = 0.019$), employment ($r = -0.275$, $P < 0.001$), smoking ($r = -0.1077$, $P < 0.001$), sleep duration ($r = -0.175$, $P < 0.001$), diabetes duration ($r = 0.234$, $P < 0.001$), and presence of complications ($r = 0.185$, $P < 0.001$). With regards to physician-related distress, the factors correlated included marital status ($r = -0.127$, $P = 0.011$), interval between visits ($r = 0.178$, $P < 0.001$) and obesity ($r = -0.106$, $P = 0.035$). Regimen-related distress was significantly correlated to diabetes duration ($r = 0.183$, $P < 0.001$) and severe hypoglycemia ($r = 0.130$, $P = 0.009$), whereas interpersonal distress was significantly correlated to diabetes duration ($r = 0.139$, $P = 0.005$), interval between visits to the clinic ($r = 0.121$, $P = 0.016$), neuropathy ($r = 0.108$, $P = 0.031$), and hospital admissions ($r = 0.125$, $P = 0.013$).

The total level of distress score was significantly positively correlated with the duration of diabetes ($r = 0.166$, $P = 0.001$), gender ($r = 0.175$, $P = 0.016$), interval between visits ($r = 0.114$, $P = 0.023$), presence of diabetes complications ($r = 0.126$, $P = 0.012$), hospital admission due to diabetes-related conditions ($r = 0.101$, $P = 0.044$), presence of neuropathy ($r = 0.178$, $P < 0.001$), severe hypoglycemia ($r = 0.166$, $P = 0.001$), and dyslipidemia ($r = 0.105$, $P = 0.035$). There were no significant correlations between the level of distress and age, marital status, educational level, income level, employment, smoking, physical activity, sleep duration, treatment regimen, presence of cerebrovascular accident,

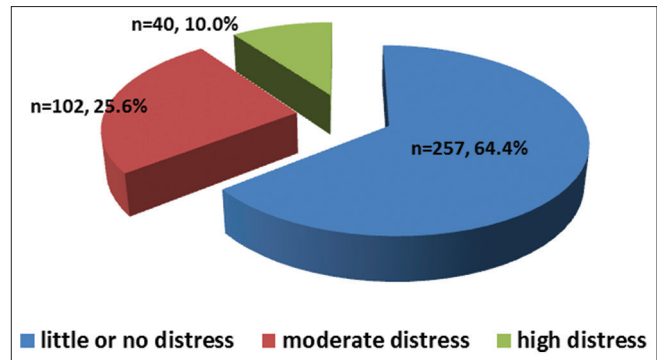


Figure 2: Levels of distress in 399 T2DM patients

ischemic heart disease, peripheral vascular disease, retinopathy, nephropathy, hypertension, and obesity. Multivariate analysis showed that longer duration of diabetes (>15 years) ($B = 0.089$, $\beta = 0.136$, $P = 0.011$, 95% CI of 0.020 to 0.157), female gender ($B = 0.095$, $\beta = 0.125$, $P = 0.016$, 95% CI of 0.034 to 0.185), longer intervals in between visits (>6 months) ($B = 0.117$, $\beta = 0.105$, $P = 0.034$, 95% CI of 0.009 to 0.225), and having experience episodes of severe hypoglycemia ($B = 0.287$, $\beta = 0.115$, $P = 0.030$, 95% CI of 0.028 to 0.547) were the most significant factors related to higher levels of distress of T2DM patients. Duration of diabetes longer than 15 years increases the risk for high distress by 3.6 times, female gender increases the risk for high distress by 3.4 times, the interval between clinic visits longer than 6 months increases the risk for high distress by 5.3 times, and patients experiencing severe hypoglycemia increases the risk for high distress by 5.8 times.

Discussion

This study has highlighted several points pertaining to DRD. One, our study showed that around 35.6% of the participants screened positive for moderate to high DRD on a DDS-17 scale. This is higher than the 25% prevalence reported on a Saudi population that was conducted in 2018 by Aljuaid *et al.*,^[34] but is lower compared to other studies from various parts of the world including Malaysia (49.2%),^[30] China,^[36] Iraq,^[37] and many other countries.^[25,32] These differences in the prevalence of DRD may be due to the different assessment tools used in the survey or might be a result of the variation in the population characteristics used in the study. However, in contrast to the Aljuaid study, the majority (86.5%) of our study population was more than 40 years old, thus there was a higher propensity of depression among the older population.^[33] Studies have shown that the odds of depression among the elderly are increased, and they seek more treatment in inpatient facilities compared to their younger counterparts and the nondiabetics.^[38] Furthermore, the older the patient gets, the more prevalent the complications and more tendency to have more medications, apart from lesser physical mobility and lesser social support.^[39]

Next, the prevalence of DRD was higher among females compared to males (15.11% versus 6.4% in males). This finding is consistent with other previous studies showing that DRD among

Table 3: Sociodemographic, anthropometric and laboratory variables according to levels of distress

Variables	n	Little or no distress	Moderate distress	High distress	χ^2, P
Age groups					
20-40	54	35 (64.8)	16 (29.6)	3 (5.6)	0.681
40-60	243	154 (63.4)	61 (25.1)	28 (11.5)	
>60	102	68 (66.7)	25 (24.5)	9 (8.8)	
Gender					
Male	233	154 (66.1)	64 (27.5)	15 (6.4)	0.016
Female	166	103 (62.0)	38 (22.9)	25 (15.1)	
Marital status					
Single	25	16 (64.0)	8 (32.0)	1 (4.0)	0.641
Married	307	198 (64.5)	77 (25.1)	32 (10.4)	
Divorced	36	20 (55.6)	12 (33.3)	4 (11.1)	
Widow	31	23 (74.2)	5 (16.1)	3 (9.7)	
Educational level					
Illiterate	86	58 (67.4)	18 (20.9)	10 (11.6)	0.597
High school or less	227	141 (62.1)	65 (28.6)	21 (9.3)	
Postgraduate	86	58 (67.4)	19 (22.1)	9 (10.5)	
Income					
<5000	196	127 (64.8)	48 (24.5)	21 (10.7)	0.468
5000-15000	178	111 (62.4)	48 (27.0)	19 (10.7)	
>15000	25	19 (76.0)	6 (24.0)	0	
Employment					
Unemployed	156	98 (62.8)	39 (25.0)	19 (12.2)	0.753
Retired	109	69 (63.3)	29 (26.6)	11 (10.1)	
Employed	134	90 (67.2)	34 (25.4)	10 (7.5)	
Smoking					
Non-smoker	289	189 (65.4)	67 (23.2)	33 (11.4)	0.306
Former smoker	34	20 (58.8)	12 (35.3)	2 (5.9)	
Current smoker	76	48 (63.2)	23 (30.3)	5 (6.6)	
Physical activity					
<150 h	265	170 (64.2)	67 (25.3)	28 (10.6)	0.412
150-300 h	116	78 (67.2)	27 (23.3)	11 (9.5)	
>300 h	18	9 (50.0)	8 (44.4)	1 (5.6)	
Sleep duration					
<6 h	154	107 (69.5)	28 (18.2)	19 (12.3)	0.001
6-8 h	203	132 (65.0)	53 (26.1)	18 (8.9)	
>8 h	42	18 (42.9)	21 (50.0)	3 (7.1)	
Duration of diabetes					
<5 years	137	107 (78.1)	26 (19.0)	4 (2.9)	0.001
5-10 years	145	81 (55.9)	46 (31.7)	18 (12.4)	
10-15 years	61	34 (55.7)	18 (29.5)	9 (14.8)	
>15 years	56	35 (62.5)	12 (21.4)	9 (16.1)	
Treatment regimen					
OHA only	203	139 (68.5)	47 (23.2)	17 (8.4)	0.004
Insulin only	79	37 (46.8)	30 (38.0)	12 (15.2)	
Insulin + OHA	95	61 (64.2)	23 (24.2)	11 (11.6)	
Lifestyle modification	22	20 (90.9)	3 (9.1)	0	
Interval between visits					
<3 months	93	67 (72.0)	15 (16.1)	11 (11.8)	0.008
3-6 months	251	165 (65.7)	65 (25.9)	21 (8.4)	
>6 months	55	25 (45.5)	22 (40.0)	8 (14.5)	
Presence of complications					
Yes	157	96 (61.1)	34 (21.7)	27 (17.2)	<0.001
No	243	161 (66.5)	68 (28.1)	13 (5.4)	
Cerebrovascular accident					
Yes	10	5 (50.0)	4 (40.0)	1 (10.0)	0.558
No	389	252 (64.8)	98 (25.2)	39 (10.0)	
Ischemic heart disease					
Yes	10	6 (60.0)	2 (20.0)	2 (20.0)	0.556
No	389	251 (64.5)	100 (25.7)	38 (9.8)	

Contd...

Table 3: Contd...

Variables	n	Little or no distress	Moderate distress	High distress	χ^2, P
Peripheral vascular disease					
Yes	2	2 (100)	0	0	0.574
No	397	255 (64.0)	102 (25.7)	40 (10.1)	
Retinopathy					
Yes	92	65 (70.7)	12 (13.0)	15 (16.3)	0.002
No	307	192 (62.5)	90 (29.3)	25 (8.1)	
Nephropathy					
Yes	17	8 (47.1)	6 (35.3)	3 (17.6)	0.284
No	382	249 (65.2)	96 (25.1)	37 (9.7)	
Neuropathy					
Yes	79	43 (54.4)	17 (21.5)	19 (24.1)	<0.001
No	320	214 (66.9)	85 (26.6)	21 (6.6)	
Hospital admission					
Yes	20	8 (40.0)	9 (45.0)	3 (15.0)	0.061
No	379	249 (65.7)	93 (24.5)	37 (9.8)	
Severe hypoglycemia					
Yes	31	13 (41.9)	10 (32.3)	8 (25.8)	0.003
No	368	244 (66.3)	92 (25.0)	32 (8.7)	
Hypertension					
Yes	137	93 (67.9)	25 (18.2)	19 (13.9)	0.020
No	262	164 (62.6)	77 (29.4)	21 (8.0)	
Dyslipidemia					
Yes	169	103 (60.9)	41 (24.3)	25 (14.8)	0.025
No	230	154 (67.0)	61 (26.5)	15 (6.5)	
Obesity					
Yes	183	127 (69.4)	37 (20.2)	19 (10.4)	0.077
No	216	130 (60.2)	65 (30.1)	21 (9.7)	
Anthropometric and laboratory values					
SBP		138.2±19.6	136.1±19.6	138.4±16.9	0.635
DBP		81.9±14.0	81.4±12.7	78.1±12.3	0.253
BMI		31.1±6.7	28.9±5.7	31.9±7.9	0.009
Triglycerides		1.6±1.1	1.9±1.8	1.8±0.9	0.099
LDL		2.4±0.9	2.7±1.0	2.6±1.0	0.008
HDL		1.3±0.5	1.5±1.1	1.3±0.4	0.033
HbA1c					
<7		52 (61.2%)	23 (27.1%)	10 (11.8%)	0.443
7-8		74 (63.2%)	35 (29.9%)	8 (6.8%)	
>8		131 (66.5%)	44 (22.3%)	22 (11.2%)	

female diabetics is higher compared to males.^[34,40-44] It has been reported that these gender differences might be related to sex differences in the coping mechanisms or differential biological responses to depression including inflammatory response and/or hypothalamic-pituitary-adrenal (HPA) axis dysregulation.^[45] Men can easily distract themselves and can participate in exercises, whereas women have more tendency to contemplate and show more depressive symptoms such as binge-eating and isolation.^[45]

Long-standing diabetes has been shown to have a psychiatric effect on the patient’s quality of life. Though the causal relationship between diabetes and depression is not well-established, it has been found that the association between the “duration” of diabetes and depression is “J-shaped,” meaning the longer the duration of diabetes, the higher is the risk for depression with an odds ratio of 1.92.^[46] Similar results were also reported showing long duration of diabetes either direct or indirect causes of distress.^[34,47,48]

Long intervals between clinic visits were also shown to be significantly related to a high prevalence of DRD. This also holds through for patients who have to take more medications, and those who are on insulin plus OHA, thus they need to have frequent short follow-up visits. Deterioration in diabetes management is an important factor to consider particularly among elderly diabetics. The longer it takes for these patients to be supported through regular clinic visits influences their behavior. A study showed that it is essential to provide patients (particularly the elderly) with social support and enable them to enhance their self-care abilities and improve their quality of life.^[49] In addition to the higher risk for distress, these patients need more reassurance particularly when they have to follow strict dietary recommendations, forgetting medications, and even self-care.^[50] Disengagement from self-care tasks (e.g. skipping insulin doses/tablets, or not monitoring blood glucose), unhealthy or uncontrolled eating, risk-taking behaviors, nonattendance at clinic consultations, or long intervals in between clinic visits may all be related to diabetes burnout.^[51]

We also found out that the duration of sleep is related to a higher risk for DRD. Studies have shown that poor sleep and short sleep duration are associated with increased risk of cardiovascular diseases and psychosocial distress.^[52] Whether this relationship is causal, suboptimal sleep may be mediated by psychological distress, and maybe a mediator between DRD and diabetes quality of life.^[53,54] The presence of comorbid conditions including retinopathy, severe hypoglycemia, hypertension, and dyslipidemia and its association to increased incidence of DRD were reported by several authors.^[21,35,55,56] In fact, there were studies that have reported predicted fatal coronary artery disease among patients with moderate to high DRD.^[57] Psychosocial issues including DRD interfere with the patient's self-care practices, and this leads to poor management of T2DM resulting from eating disorders, reduced or lack of physical activity, social disengagement, and even decreased cognition.^[57,58] This distress, to a greater or lesser degree, is part of having to live with and manage diabetes. It can fluctuate over time and may peak during challenging periods, for example, soon after diagnosis, during major changes in the treatment regimen, or at diagnosis/worsening of long-term complications. It can also peak at times of heightened general stress when the added burden of diabetes self-care becomes too much.

This paper discussed the relevance of diagnosing DRD among patients with T2DM among primary care physicians. Family physicians are on the frontlines responsible for the diagnosis and treatment of a significant majority of people with T2DM. Thus, it is imperative that primary care physicians have firsthand knowledge on the assessment, screening, and diagnosis of DRD to institute a structured approach, management, and follow-up of T2DM patients with signs and symptoms of DRD. As a result, there will be improved recognition and prompt management of distress or depression that will benefit not only the patients but also the entire general medical practice relieving the burdens of innumerable patient consultations.

Despite the findings highlighted in this study, we believe, we were limited to the fact that a multicenter multiregional approach should have been done to investigate and confirm our results as well as the result from the Aljuaid study conducted among the Saudi population.^[31] Furthermore, it is also possible that there were biases in patient responses in an interviewer-administered survey, especially on the quality of responses, which may be sensitive to the respondents, or patients may distort information to present what they perceive more favorable to the interviewer.

Conclusion

This study showed a high prevalence of moderate to severe DRD (35.6%). We were able to identify several factors related to an increased prevalence of DRD including long duration of diabetes, female gender, long intervals between clinic visits, and presence of comorbidities such as hypertension, retinopathy, severe hypoglycemia, and dyslipidemia. Increased risk for DRD was found to be 3.6 times more among patients with >15 years

of diabetes, 3.4 times more among females, 5.3 times more among patients who have longer than 6 months interval between clinic visits, and 5.8 times more among patients who experienced severe hypoglycemia. This study further confirms that DRD is a significant health problem that needs to be seriously addressed as it has a cause-effect relationship with quality of life and poor outcomes from the disease. Health care providers should focus on reducing DRD and devise ways to increase self-care practices and coping skills. Future studies are recommended to substantiate our findings.

Summary of key points

1. The highest of the four scale components was the regimen-related distress score, followed by emotional distress, physician-related distress, and interpersonal distress.
2. There were 40 patients (10.0%) with high distress, 102 (25.6%) with moderate distress, and 257 (64.4%) with little or no distress.
3. Higher percentage of DRD was observed among females, those with a short duration of sleep (<6 hours), those who were diabetic for >15 years, those who were on insulin and on a combination of insulin plus OHA, and patients who infrequently visit the clinic.
4. Duration of diabetes longer than 15 years increases the risk for high distress by 3.6 times, female gender increases the risk for high distress by 3.4 times, the interval between clinic visits longer than 6 months increases the risk for high distress by 5.3 times, and patients experiencing severe hypoglycemia increases the risk for high distress by 5.8 times.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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