

Diabetic Distress and its Relationship with Demographic and Clinical Characteristics of patients with Type 2 Diabetes in Zanjan University of Medical Sciences in 2019

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Abstract

Background: Diabetes is a chronic and progressive metabolic disease with profound effects on mental health.

Objectives: This study aimed to determine diabetic distress status and its relationship with some demographic characteristics and clinical outcomes in patients with type 2 diabetes.

Methods: This study was part of a larger study on psychological adjustment and diabetic distress. Data were collected using a demographic questionnaire and a standard 17-item tool for measuring diabetic distress and were analyzed using descriptive and analytical statistics, including mean (standard deviation), independent t-test, analysis of variance, and Pearson correlation coefficient, in SPSS version 22 software.

Results: The mean (SD) of distress score in patients with type 2 diabetes was 2.12 (0.75). The prevalence of distress worthy of clinical attention was 11.4%. Regarding distress dimensions, the highest mean distress score was related to the emotional burden dimension 2.82 (1.06), and the lowest mean score was obtained in the dimension of interpersonal distress 1.48 (0.84). The overall distress score was significantly associated with hospitalization history ($P \leq 0.001$) and history of diabetes-related problems ($P=0.001$). Also, the total distress score was significantly related to physical complications of diabetes ($P=0.001$), type of treatment ($P=0.001$), and occupation ($P=0.018$). The overall distress score significantly correlated with monthly income ($r=-0.171$, $P=0.001$), disease duration ($r=0.268$, $P=0.001$), and HbA_{1c} level ($r=0.115$, $P=0.032$).

Conclusion: Since the level of distress shows interindividual variations and is influenced by demographic, clinical, and social features, it is recommended that those in charge of providing care to diabetic patients consider individualized distress coping training for patients with diabetes.

Keywords: *type 2 diabetes, diabetic distress, clinical profile*

Introduction

Diabetes is one of the most challenging chronic and growing diseases in the world, especially in developing countries in the 21st century [1,2]. The main feature of diabetes is a metabolic disturbance and altered metabolism of carbohydrates, fats, and proteins due to a relative or absolute deficiency of insulin secretion or

insulin resistance in target cells. In 2019, the number of diabetic patients across 138 countries around the globe was estimated at 436 million (a prevalence of 8.3%) [1]. It is estimated that 642 million people around the world will develop diabetes by 2040. Over the past two decades, noteworthy studies have been conducted to shed light on possible causes and prevalence of

diabetes worldwide, the results of which support the increasing prevalence and socioeconomic burden of diabetes in low- and middle-income countries where about 43% of all diabetic patients live [3]. The economic burden of diabetes was estimated at \$ 673 billion in 2015, consuming 12% of all health care expenditure spent on providing care for patients with diabetes [4]. Diabetes has been responsible for around 5 million deaths (14.5% of all deaths related to disease-associated preventable complications) among 20-79-year-olds in 2019. According to the 2019 report of the International Diabetes Federation, 5500,000 people in Iran have had diabetes up to 2020, giving a prevalence of 9.6% [5,6]. This physically and mentally exhausting disease imposes a great burden on the patient, demanding him/her to adopt substantial lifestyle modifications in order to achieve metabolic control and prevent disease-related complications, which further complicates life for patients and brings them emotional turbulence [2]. People with diabetes are at the risk of compromised psychological well-being, a phenomenon that has been reported in about half of newly diagnosed (recent three months) patients, mostly as a result of the necessity of the patient to make peace with the disease. Factors such as worries about hypoglycemia, diabetes complications, inappropriate living environments, lack of social support, lack of compliance with treatment, and negligence for self-care may lead to grave diabetic complications, including diabetic distress, impairing cognitive performance and self-care [7]. Diabetic distress is a term first introduced by a group of psychologists and psychiatrists at the Joslin Diabetes Center in 1995. They introduced diabetic distress as a concept dealing with the challenges of psychosocial adaptation in patients with diabetes [8]. In particular, diabetic distress refers to experience the negative emotions of life-challenging diabetes needs regardless of the type of the disease. Issues with the past, uncontrolled disease-related complications, financial shortcomings, lack of access or limited access to health care services, and alcohol consumption and drug abuse (especially among women) can exacerbate distress. Distress occurs as a result of emotional and behavioral responses to a chronic exhausting illness such as diabetes and is a psychosocial entity that is largely under the

influence of self-management. In individuals with diabetes, distress denotes unique concerns that are parts of a patient's experiences when trying to rein a chronic or severe disease such as diabetes [9]. The prevalence of diabetic distress varies greatly in different populations. Meta-analyses on distress in people with type 2 diabetes have disclosed a significant link between the female gender and elevated levels of distress. Newly diagnosed patients with type 2 diabetes may develop distress right after the diagnosis, making this phenomenon a serious problem for these individuals. A study reported that 36% of people with diabetes would experience diabetic distress. In another study, out of 600 patients with diabetes, approximately 60% reported at least one negative emotion with regard to diabetes [8]. In their study in 2021, Vidya KR et al. reported a prevalence of 58.5% for distress in patients with diabetes [3]. In their study, Ratenesh et al. (2020) also reported a mean DDS score ≥ 3 came out to be 19.6% [10]. In a study conducted by Onyenekwe et al. in 2020, the prevalence of distress was reported at 52% in diabetic patients [11]. Likewise, Baradaran et al. (2013) reported that 35% of Iranian patients with diabetes suffered from diabetic distress [12]. Overall, diabetic distress is regarded as a predictable and preventable psychological problem in patients with diabetes. Besides, distress can have negative impacts on the patient's life and his/her efforts to adapt to the disease, so if distress is not controlled, many complications and ramifications may ensue [3]. The results reported in this article are part of the results of a larger study titled "Assessment distress and adjustment in patients with type 2 diabetes referred to Valiasr Hospital in Zanzan and Shafieeh Special Clinic in 2019". The results related to psychological adjustment have been published in the *Journal of Preventive Nursing and Midwifery Care*, 2020;10 [1]:18-25 [13]. In this article, the results related to the correlation between diabetic distress and individual and clinical factors are reported.

Methods

The methodology of this article is derived from a larger study with the code of ethics IR.ZUMS.REC.1398.308 [13]. The data were collected using a questionnaire for demographic and clinical characteristics, as well as the Diabetic

Distress Scale. The demographic-clinical questionnaire included queries about gender, age, marital status, education, average monthly income (Tomans), occupation, duration of diabetes, history of hospitalization due to diabetes, family history of diabetes, and the level of HbA_{1c}.

The Diabetic Distress Scale is a valid questionnaire developed by Polonsky at the University of California to measure overall distress and its dimensions. This tool contains 17 items organized in the four dimensions of emotional burden (with five questions), physician-related distress (with four questions), diet-related distress (with five questions), and interpersonal distress (with three questions). The tool is scored based on a six-point Likert scale [1-6], giving a total score of 17-102. Polonsky et al. proposed for each person, the total score of each dimension should be calculated and divided by the number of questions of the same dimension [14]. In this way, the average score is obtained according to the Likert scale of 1-6. Here, is considered a mean score of 3 or greater as the cut-off for distress requiring clinical attention.

Cronbach's alpha of the main instrument was reported to be 87%, and the internal consistency of the whole tool was 0.95 [14]. This questionnaire was validated in the study of Golshaeian et al., who reported that the DDS-17 questionnaire could be used as a useful tool for

determining diabetic patients' distress in various dimensions. A significant correlation was reported between the HbA_{1c} level and the distress score derived from the DDS-17 scale ($r=0.450$, $P<0.001$), which surpassed the correlation between the Beck questionnaire and HbA_{1c} level ($r=0.353$, $P<0.001$) and also reflected other dimensions of the patient's distress. Also, the DDS-17 questionnaire delivered a stronger correlation with HbA_{1c} levels compared to the SDSCA questionnaire and offered better performance in individual management of diabetes [15]. In the present study, Cronbach's alpha coefficient of 0.891 indicated the reliability of the instrument.

The data were analyzed by SPSS software version 22 using descriptive statistics, Pearson correlation coefficient, independent t-test, and one-way analysis of variance followed by the Bonferroni post-hoc test.

Results

In this study, 350 patients with type 2 diabetes were studied, of whom 58.9% were female. The mean and standard deviation of the age of the participants was 58.58 ± 11.85 years, with an age range of 22-86 years. Most of the participants were married (81.7%), illiterate (42.3%), housewives (54.3%), and lived in urban areas (79.1%) (Table 1).

Table 1: Demographic and Clinical Characteristics of Patients with Type 2 Diabetes

Demographic variables		Number	Percentage	Clinical variables		Number	Percentage
Gender	Male	144	41.1	History of hospitalization due to diabetes	Yes	181	51.7
	Female	206	58.9		No	169	48.3
Marital status	single	8	2.3	Diabetic history among family and relatives	Yes	242	69.1
	married	286	81.7		No	108	30.9
	widow	56	16.0	History of physical, psychological, and social problems due to diabetes	Yes	176	50.3
Education	illiterate	148	42.3		No	174	49.7
	reading and writing	100	28.6		No problem	174	49.7
	Third-grader	42	12.0	Complication of diabetes	Eye	40	22.7
	diploma	37	10.6		Kidney	14	8.0
	Academic education	23	6.6		Foot ulcers and foot pain	4	2.3
Occupation	employee	16	4.6		Cardiovascular	2	1.1
	freelance	35	10.0		Nerves	8	4.5
					Several organs	108	30.9
				Type of treatment	Oral	197	56.3

Place of residence	retired	47	13.4	HbA _{1c}	Insulin	86	24.6
	housewife	187	53.4		All three	9	2.6
	unemployed	36	10.3		Oral-insulin	41	11.7
	others	29	8.3		Oral-diet	1	0.3
	city	277	79.1		≤ 7	114	32.6
	country	73	20.9		> 7	236	67.4
Quantitative variables							
variable	mean±	standard deviation		Minimum		maximum	
Age (year)		58.58±11.85		22.00		86.00	
Average monthly income (Toman)		1852971.43±1454043.37		100000		10000000	
HbA_{1c} (%)		8.34±2.41		4.00		17.10	
Years affected by diabetes		9.87±7.70		1.00		40.00	

The mean and standard deviation of distress score in patients with type 2 diabetes was 36.07 ± 12.86 and according to 1-6 Likert scale range 2.12 ± 0.75. The highest and lowest mean distress score on the Likert scale belonged to the emotional

burden dimension (2.82 ± 1.06), and interpersonal distress dimension (1.48 ± 0.84) respectively. Distress scores exceeded the threshold of 3 in 40 (11.4%) participants (Table 2).

Table 2: Distress and its Subscales Status in Patients with Type 2 Diabetes

Subscale of distress	Level of distress*	Number	Percentage	mean± standard deviation	mean± standard deviation In the interval 1-6
Emotional Burden	>3	158	45.1	14.11±5.30	2.82±1.06
	<3	190	54.3		
	Missed data	2	0.6		
physician-related distress	>3	44	12.6	7.17±3.70	1.79±0.92
	<3	306	87.4		
	Missed data	0	0		
regimen-related distress	>3	56	16.0	10.33±4.26	2.06±0.85
	<3	293	83.7		
	Missed data	1	0.3		
interpersonal distress	>3	22	6.3	4.46± 2.54	1.48±0.84
	<3	328	93.7		
	Missed data	0	0		
Total distress	>3	40	11.4	36.07±12.86	2.12±0.75
	<3	307	87.7		
	Missed data	3	0.9		

*>3: worthy of clinical attention, <3 low distress

The findings of the independent t-test showed that the mean score of emotional distress was higher in women and those with a family history of diabetes than in men and patients without a family history of diabetes ($P < 0.05$). Also, the mean total score of distress and its dimensions (except for physician-related distress) showed significant differences in terms of the presence or absence of

a history of hospitalization due to diabetes ($P < 0.001$). Also, the mean score of total distress and its dimensions (except for interpersonal distress) were significantly higher in individuals with a history of diabetes-related problems compared to those without such problems ($P < 0.05$) (Table 3).

Table 3: Comparison of Mean and Standard Deviation of Distress and its Dimensions by Personal Characteristics in Patients with Type 2 Diabetes

Distress Variables		Total		Emotional burden		Physician-related distress		Regimen-related distress		Interpersonal Distress	
		Mean ± SD	t (P value)	Mean± SD	t (P value)	Mean± SD	t (P value)	Mean± SD	t (P value)	Mean± SD	t (P value)
History of hospitalization due diabetes	yes	39.03±12.35	4.575	15.68±5.03	6.022	7.47±3.70	1.594	11.09±4.10	3.500	4.80±2.77	2.557
	no	32.89±12.67	(0.000)	12.41±5.07	(0.000)	6.84±3.68	0.112	9.52±4.29	(0.001)	4.11±2.21	(0.011)
Family history of diabetes	yes	36.47±12.35	0.857	14.52±5.15	2.131	7.13±3.52	-0.253	10.33±4.19	-0.003	4.49±2.66	0.273
	no	35.19±13.94	(0.392)	13.21±5.55	(0.034)	7.24±4.08	(0.800)	10.33±4.42	(0.998)	4.41±2.23	(0.785)
History of physical, psychological and social problems due to diabetes	yes	39.83±11.61		16.16±4.52		7.65±3.67		11.42±4.17		4.61±2.66	
	no	32.25±12.97	5.740 (0.001)	12.02±5.24	7.89 (0.001)	6.68±3.67	2.46 (0.014)	9.24±4.07	4.95 (0.001)	4.32±2.40	1.07 (0.283)
Gender	male	35.44±13.79	-0.760	13.43±5.50	-2.001	7.34±3.93	0.737	10.41±4.71	0.292	4.30±2.29	-1.01
	female	36.51±12.19	(0.448)	14.59±5.12	(0.046)	7.04±3.52	(0.461)	10.28±3.93	(0.770)	4.58±2.29	(0.312)

According to variance analysis, the means of total distress score and the scores obtained in the dimensions of emotional burden and diet-related distress showed significant differences in terms of the types of diabetes-related physical problems and occupational classes (Table 4). The results of the Bonferroni test showed that the differences observed in the emotional burden dimension and total distress score were attributable to the mean differences related to foot ulcer & pain compared with eye and renal problems. The differences in the diet-related distress and total distress score is due to the mean differences related to foot ulcer & pain compared with eye problems.

As shown in Table 4, there was a significant relationship between the mean score of the emotional burden dimension and the overall distress score in terms of different occupational levels. According to the Bonferroni post-hoc test, this difference was related to the variability

observed between unemployed people and non-governmental and retired individuals. However, there was no significant difference in the mean score of total distress regarding different occupational levels ($P > 0.05$).

The results of the one-way analysis of variance showed that, except for the physician-related distress dimension, there was a significant difference in the mean scores of all dimensions in terms of the type of treatment (Table 4). The Bonferroni post-hoc test showed that the difference in the dimensions of emotional burden and diet-related distress related to the difference between insulin therapy and diet therapy. On the other hand, the difference observed in the interpersonal distress dimension and total distress score are rooted in the differences between diet therapy and triplet therapy (oral drugs, insulin and diet).

Table 4: The results of Analysis of Variance of Overall Distress and its Dimensions by Clinical and Demographic Characteristics in Patients with Type 2 Diabetes

Distress	Variables	Overall		Emotional burden		Physician-related distress		Regimen-related distress		Interpersonal distress	
		mean± SD	F (P value)	mean± SD	F (P value)	mean± SD	F (P value)	mean± SD	F (P value)	mean± SD	F (P value)
Physical complication	Eye	33.33±9.66		13.60±4.66		6.43±3.21		9.67±5.05		4.40±1.63	
	kidney	37.23±8.38		13.86±2.65		7.93±3.10		9.86±4.46		4.03±1.67	
	Foot	50.25±23.97	4.545	17.50±7.18	5.75	11.00±8.86	1.822	9.41±4.85	3.213	4.72±3.38	1.614
	cardiovascular	39.00±7.07	(0.001)	14.50±0.70	(0.000)	8.00±0.00	(0.11)	10.41±3.93	(0.008)	4.62±2.73	(0.15)
	nerves	41.13±16.22		15.88±3.68		8.75±4.46		12.14±4.39		4.11±1.65	
Types of treatment	Multi organs	42.09±10.84		17.41±4.18		7.85±3.54		10.03±4.23		4.07±1.68	
	Oral drugs	33.77±12.74		12.95±5.16		6.90±3.67		9.60±4.06		4.34±2.42	
	Insulin	40.84±10.30		16.74±4.39		7.48±3.24		12.07±4.18		4.55±2.11	
	Diet	26.56±8.30	8.70	9.63±4.24	13.47	5.88±2.18	1.62	7.56±2.63	7.73	3.50±0.63	4.01
	Oral drugs +Insulin+Diet	42±16.91	(0.001)	15.11±6.25	(0.001)	8.11±4.25	(0.168)	11.33±4.92	(0.001)	7.44±5.54	(0.003)
Occupation	Oral drugs +Insulin	39.71±14.24		15.88±4.93		8.05±4.82		11.12±4.45		4.66±3.01	
	employee	33.27±12.57		12.67±5.02		6.53±3.44		9.67±5.05		4.40±1.63	
	Non-governmental	32.50±13.59		11.65±5.66		7.06±3.85		9.86±4.46		4.03±1.67	
	retired	33.02±14.66	2.763	12.38±5.44	5.494	6.62±3.44	0.998	9.41±4.85	1.943	4.72±3.38	0.722
	housewife	37.05±12.11	(0.018)	14.76±5.04	(0.000)	7.22±3.57	(0.419)	10.41±3.93	(0.083)	4.62±2.73	(0.607)
Education	unemployed	41.25±13.16		16.72±5.26		8.28±4.62		12.14±4.39		4.11±1.65	
	others	34.14±11.57		13.17±4.55		6.86±3.56		10.03±4.23		4.07±1.68	
	illiterate	37.23±10.67		15.01±4.82		7.03±3.19		10.88±3.95		4.29±1.93	
	reading and writing	36.90±14.26		14.17±5.59		7.55±4.02		10.41±4.52		4.77±2.91	
	Third-grader	33.76±13.52	1.75	13.05±5.33	3.97	7.26±4.28	0.586	9.36±3.88	1.83	4.17±2.88	0.729
	diploma	35.14±13.41	(0.139)	13.68±5.13	(0.004)	7.05±3.74	(0.673)	9.89±4.26	(0.122)	4.51±2.81	(0.573)
	Academic education	30.83±15.99		10.74±5.85		6.39±4.18		9±5.28		4.70±3.08	

In terms of educational levels, there was a significant difference among individuals only in the dimension of emotional burden (Table 4). The results of the Bonferroni post-hoc test showed that this difference related to illiterate people or those with writing and reading abilities and individuals with academic education. In other words, the distress of people with an academic education was less.

The results of Pearson correlation analysis showed that the total distress score and the scores

of the emotional burden and diet-related distress dimensions were weakly and inversely correlated with monthly income. Also, age showed a direct but weak correlation with emotional burden and diet-related distress. Duration of diabetes (in years) had a weak direct correlation with all distress dimensions, as well as with the total distress score. Finally, HbA1c levels weakly and directly correlated with the total distress score, emotional burden, and diet-related distress (Table 5).

Table 5: Correlation between Distress and Some Clinical and Demographic Characteristics of Patients with Type 2 Diabetes

		monthly income	age	Years affected by diabetes	HbA1c
Total Distress	r	-0.171*	0.082	0.268*	0.115*
	P-value	0.001	0.127	0.001	0.032
	Number	347	347	350	347
Emotional burden	r	-0.194*	0.121*	0.277*	0.177*
	P-value	0.000	0.023	0.000	0.001
	Number	348	348	348	348
Physician-related distress	r	-0.069	-0.016	0.119*	0.016
	P-value	0.201	0.768	0.026	0.769
	Number	350	350	350	350
Regimen-related distress	r	-0.162*	0.129*	0.248*	0.119*
	P-value	0.002	0.026	0.000	0.026
	Number	349	349	349	349
Interpersonal Distress	r	-0.087	-0.025	0.115*	-0.015
	P-value	0.105	0.636	0.031	0.781
	Number	350	350	350	350

Discussion

Our study findings showed the prevalence of diabetic distress in type 2 diabetic patients was

11.4%, with a mean distress score of 2.12. The prevalence of diabetic distress was reported as 58.57% in a study by Viday et al. (2021) in India

[3], 19.6% in another study in India by Ratnesh et al. (2020) [10], 51.9% in the report of Onyenekwe et al. (2021) from Nigeria [11], 39% by Wong et al. (2017) in Canada [16], 31% by Zanchetta et al. (2016) in Brazil [17], and 25% by Aljuad Majed et al. (2018) in Saudi Arabia [2]. In another study in China, Zhou et al. (2017) reported the prevalence of 19% and 23.1% for severe and moderate diabetic distress, respectively [18]. In Iran, Baradaran et al. (2013) reported a prevalence of 35% for diabetic distress [12]. This great variability in the prevalence of diabetic distress can be attributed to the different scoring of the DDS-17 tool in various studies. Some researchers, such as Onyenekwe et al. (2021) [11], used the same scoring method as the present study and designated the threshold of 3 for detecting clinically significant distress requiring medical attention (as recommended by the developers of the tool). However, others, such as Zhou et al. (2017) [18], used a different classification, designating scores below two as low or no distress, 2-3 as moderate distress, and above three as severe distress.

In the present study, the highest and lowest levels of distress were related to the dimensions of emotional burden and interpersonal distress, respectively. In the study of Onyenekwe et al. (2020), the highest and lowest mean scores were related to the dimensions of emotional burden and physician-related distress, respectively [11]. In the study of Zanchetta et al. (2016), the highest mean score was obtained in the domain of emotional burden, while the dimension of physician-related distress and interpersonal distress achieved the lowest scores [17]. In the study of Aljuaid et al. (2018), 54% of the participants had moderate to severe emotional distress, but only 7.7% expressed interpersonal distress [2]. Tol et al. (2012) also reported the highest mean distress score in the emotional burden dimension [19]. In the study of Zhou et al. (2017), the highest mean score was related to the dimension of diet-related distress, followed by emotional distress in the next rank, while the lowest score was obtained for interpersonal distress [18]. Vidya et al. (2021) reported that 62.8% of their participants had moderate diet-related distress, and only 54% (the lowest) reported emotional burden distress [3]. As it can be seen, the domain of emotional burden has claimed the highest average or percentage of

distress in most studies. Diabetes emboldens emotional needs and causes psychological pressure, worry, anxiety, and sadness (due to the loss of health and disease-related complications) in affected individuals. The more these emotional needs are, the higher the diabetic distress experienced by patients.

In this study, there was no significant relationship between gender and distress in most dimensions; however, women reported significantly higher distress in the dimension of the emotional burden. Likewise, Morowatisharifabad et al. (2007) reported that women experienced more unsupportive behaviors and psychological pressure from the family compared to men [20]. In studies by Vidya et al. (2021) [3], Wong et al. (2017) [16], and Baradaran et al. (2013) [12], no link was noticed between the overall distress score and gender. In explanation, it can be said that the needs of every diabetic patient, such as medications, healthy nutrition, and exercise, can be similar and independent of gender [16].

The history of diabetes-related hospitalization was significantly related to the total mean score of distress, as well as the scores obtained in the dimensions of emotional burden, diet-related distress, and interpersonal distress. In this regard, distress in all dimensions was higher among those who had a history of hospitalization. There was no significant difference between physician-related distress and hospitalization. This finding was consistent with the results of Aljuaid et al. (2018) [2].

In patients with type 2 diabetes, the history of diabetes in family members or relatives showed a significant link only with the emotional burden dimension. In studies by Aljuad et al. (2018) and Tol et al. (2012), people with a familial history of diabetes endured higher total distress and emotional burden [2,19]. It seems that witnessing diabetes-related sequela in the family and relatives can boost emotional distress among patients.

The mean score of total distress, as well as the scores of emotional burden, physician-related distress, and diet-related distress, were associated with a history of diabetes-related physical, psychological, and social problems and complications. In fact, it is expected that people suffering from diabetes complications endure a relatively higher level of distress. Analysis of

variance showed that the total mean distress score and emotional burden significantly varied in terms of different problems caused by distress. In the dimension of emotional burden, this difference is rooted in the variability observed in foot ulcers & pain vs. kidney & eye problems. Regarding diet-related distress and total distress, this difference is caused by the variability observed between foot ulcers & pain vs. eye problems. In a study by Aljuaid et al. (2018), suffering from a peripheral vascular disease was associated with diet-related distress; retinopathy was linked with the total distress and emotional burden, and nephropathy was related with diet-related and interpersonal distress, and neuropathy was associated with total distress and emotional burden [2].

Except for physician-related distress, the mean scores of all distress dimensions significantly varied in terms of the type of treatment received by diabetes patients. The difference in the dimensions of emotional burden and diet-related distress was related to the disparity observed between insulin therapy and diet therapy. Regarding interpersonal distress and total distress, this difference is rooted in the variability between diet therapy and triplet therapy (oral drugs, insulin and diet). This finding may reflect the complexity of insulin therapy and the feeling that the disease may be out of control when it comes to insulin injection. In the study of Baradaran et al. (2013), patients with type 2 diabetes who received insulin had higher physician-related distress [12], which is not in line with our observation in the present study. Baradaran et al. (2013) argued that neither patients nor physicians knew how to cope with the stress caused by insulin therapy. In the recent study, most patients expressed that their physicians did not take their concerns seriously enough or did not provide adequate instructions on how to manage diabetes [12]. Furthermore, in the study by Zhou et al. (2017), diet-related and interpersonal distresses were associated with oral medication plus insulin therapy, and physician-related distress was related to diet therapy [18].

The mean score of total distress and emotional burden were significantly associated with the occupational status. In the emotional burden domain, this difference was related to the variability observed in the mean scores obtained by unemployed patients vs. self-employed and retired individuals. In this regard, the emotional

burden was higher in unemployed people compared to self-employed and retired patients. This observation may be due to concerns over the costs and complications of diabetes. In the study of Aljuaid et al. (2018), the mean of total distress and its dimensions showed significant variabilities depending on the occupational status [2]. In the recent study, similar to our findings, unemployed people experienced higher distress. In the study of Baradaran et al. (2013), housewives revealed a relatively higher emotional burden [12], which contradicted our findings in the present study. Baradaran et al. (2013) argued that because housewives spend most of their time at home, they have enough time to think about their disease, its complications, and coping strategies. Therefore, their minds are overwhelmed with thoughts around diabetes, exaggerating their emotional burden [12].

There was also a significant difference in the mean score of emotional burden in terms of educational status, which was due to the significantly lower distress of people with academic education compared to illiterate individuals and those with only reading and writing skills. The findings of Ratnesh et al. (2020) showed that illiterate participants were 2.3 times more at risk of distress than literate individuals [10], which supported our observation in the present study. It is probable that illiteracy can boost diabetic distress primarily because of having poor knowledge about the disease, its management, and its complications.

Monthly income was significantly, inversely, and weakly associated with total distress, emotional burden, and diet-related distress. In the study of Aljuaid et al. (2018), total distress, emotional burden, and physician-related distress were significantly associated with socioeconomic status [2].

Age had a significant weak direct correlation with emotional burden and diet-related distress. In other words, emotional burden and diet-related distress hiked up with increasing age. As an explanation, it can be said that chronic diseases inflict more distress on affected individuals over time. In the study of Vidya et al. (2021); however, distress and its dimensions were not associated with age [3]. In another report by Ratnesh et al. (2020), younger people had significantly higher chances of having diabetic distress [10]. This can

be justified by the fact that at the onset of the disease, when the patient still struggles with accepting the illness, he/she may experience higher distress.

Duration of diabetes (in years) had a weak direct correlation with total distress and all its dimensions. This means that distress increases over time and by adding to the years since diabetes has been diagnosed. In a study by Viday et al. (2021), both total distress and diet-related distress were associated with disease duration [3]. In contrast to the present study, Ratnesh et al. (2020) reported that diabetic distress was 2.5 times higher in patients with a disease duration of 1-5 years than in those with a longer disease course [10]. This discrepancy can be related to the different characteristics of the populations investigated in the two studies. The people enrolled by Ratnesh et al. (2020) were a few years younger on average than our patients. It is noteworthy that 1-5 years of disease history may not be sufficient to adapt to diabetes and overcome diabetic distress, requiring more years to be accomplished.

HbA1c level had a weak direct correlation with total distress, emotional burden, and diet-related distress. So, a higher HbA1c level (i.e., more uncontrolled diabetes) predicted a higher level of distress. In studies by Wong et al. (2017) and Onyeneke et al. (2020), elevated levels of HbA1c were associated with increased distress, emotional performance, and adherence to diet therapy [11, 16]. Also, Aljuad et al. (2018) [2], Onyeneke et al. (2020) [11], and Ratnesh et al. (2020) [10] described significantly higher levels of HbA1c in diabetic patients with distress. Similarly, a study by Tol et al. (2012) revealed a direct relationship between the distress score and HbA1c level [19]. Elevated HbA1c levels indicate poor blood sugar control, which can be due to a poor diet, and imposes high distress on patients.

Conclusion

The findings of this study revealed that 11.4% participants requiring medical attention. Considering the low prevalence of diabetic distress in this study, it is suggested to re-examine the amount of diabetic distress with a lower cut-off. Also, diabetic distress in this study was related to some demographic and clinical variables, so it is suggested that the officials

involved in the work of diabetic patients pay more attention to people with a history of hospitalization, a history of problems and being treated with insulin in their training.

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Conflict of interest

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