Prevalence and Determinant Factors of Diabetes Distress in Community-Dwelling Elderly in Qom, Iran

Abstract

Background: Diabetes distress (DD) is common among the patients with type 2 diabetes (T2D), but few studies investigated this problem and its related factors in the elderly population. This study has focused on the prevalence rate of DD and its determinants in community-dwelling elderly in Qom, Iran. **Methods:** This study was cross-sectional. A total of 519 subjects community-dwelling with T2D participated in the study. Collected data contained sociodemographic information, some clinical variables (body mass index and duration of diabetes) knowledge, attitude, and self-efficacy. Participants' distress was measured via diabetes distress scale (DDS). The cut of 3 (≥3) was considered as the presence of distress. Also, the attitude, self-efficacy, and knowledge about diabetes were measured by questioner. Multiple logistic regression analysis was applied to detect predictors of DD. **Results:** The mean age of the participants was 68.38 ± 6.78 and 53.6% were female. Among the participants, 48.6% were identified with positive DD. According to the results of logistic regression analysis, being female (odds ration [OR] = 1.688, $P = 0.009$), being widowed or divorced (OR = 1.629, $P = 0.027$), being over-weight or obese (OR = 1.627, $P = 0.027$), and having less than 10 years in disease duration (OR = 1.721, $P = 0.029$), attitude (OR = 0.590, $P < 0.001$), and self-efficacy (OR = 0.658, $P = 0.009$) were identified as the independent predictors of DD. No significant association was found between DD and age, occupational status, education level, and knowledge ($P > 0.05$). **Conclusions:** The prevalence of DD is considerable among the elderly in Qom. It seems that more attention should be paid to the mental aspects of the patients with T2D specially in high risk groups.

Keywords: *Determinants, diabetes distress, elderly, prevalence, Qom*

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Introduction

The prevalence of type 2 diabetes (T2D) is rising all around the world, especially in the developing countries.[1] This disease not only does have physical complications, but also it affects quality of life and mental health of the patients.[2] The patients with T2D face various challenges and should take many responsibilities such as constant monitoring of blood sugar, taking care of their feet, regular visits to the doctor, observing their diet, adopting health behaviors, and managing interpersonal relationships. These challenges put the patients under too much pressure and may lead to psychopathologic symptoms and mental disorders.[3]

Depression and distress are the most common mental consequences among the patients with T2D.[4,5] The prevalence of diabetes distress (DD) has been reported

to be approximately 36% among these patients.[6] The DD has been defined as the patient's worries about disease control and its side effects, appearing as negative feelings, anger, frustration, and disappointment.[7] The DD, recognized as a major factor in developing depression and cardiovascular complications,[8] is associated with the elevated hemoglobin A1c (HbA1c) level.[9] Moreover, DD is also related to reduced self-care behaviors and quality of life.[6] Thus, more knowledge about DD and the factors related to it may help us with better screening and managing of it.

Among the major factors related to DD, individual factors such as knowledge about diabetes, attitude toward diabetes, and self-efficacy have been mentioned by various studies.[10-13] These three factors are modifiable and improvable, even in the older adults,[10,14] and targeting them may lead to reduced diabetes-specific

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distress.[15] Self-efficacy which is a psychological concept, expressing an individual's judgment and self-confidence to do a specific behavior, received much attention by researchers,[16] but diabetic patients' attitude toward the disease is a relatively new approach to caring diabetes.[17]

In Iran, the prevalence of DD among older patients with T2D and its related factors has not received appropriate consideration. Identification of related factors can help us with the screening, developing educational interventions, and identification of at-risk groups. This study investigated the prevalence of DD and its association with some important variables among the community-dwelling elderly in Qom, Iran.

Methods

Participants

This research was conducted as a cross-sectional study in Qom during 3 months from December 2018 through February 2019. The research population included all the elderly who were diagnosed as T2D patients at primary health care services located in the city of Qom. In Iran's primary healthcare system, T2D is diagnosed after two fasting blood sugar tests with the result of FBS ≥126 mg/dL. In Iran, age of 60 and more was considered as elderly.[18,19] The inclusion criteria were the minimum age of 60, definite diagnosis of T2D and informed consent. Also, the exclusion criteria included the presence of severe psychiatric disorders and experiencing unpleasant events (death of a relative in the past 3 months). The reason to exclude of these subjects was that the subjects may expose with mental problems and diagnosed as DD mistakenly. Presence of sever psychiatric.

The single population proportion formula was used to calculate the minimum sample size,[20-22] considering the following assumptions: a value of prevalence ($P = 0.5$), 95% confidence interval of two domains, the error of 0.05 ($d = 0.05$).[23] Due to insufficient evidences about prevalence of DD in Iran, the prevalence rate was considered 0.5 to achieve the maximum sample size.[24,25] given that the random cluster sampling was used in this study, the design effect of 1.2 was assumed. Also, with assuming a probable attrition (20%), the final sample size was estimated at 553 subjects.

Qom has four urban districts. Two health centers, as clusters, were randomly determined from each district (total eight clusters). Next, a list of older adults with T2D was obtained from each health center. The list was obtained from the electronic primary health care services records run by the Iran Ministry of Health and known as "Health Integrative System." From each list, 65–70 subjects were selected by systematic random sampling. Then, the selected patients were called by phone and invited for interview. The written consent was obtained from all participants.

The needed sociodemographic information was extracted from two sources: their registered medical record and the interviews. In general, the time required for each patient was approximately 30–40 min.

Measurements

The sociodemographic information

The sociodemographic questionnaire included age, gender, education level, employment status, marital status, body mass index (BMI), and duration of the disease (the number of years passed since the time of diagnosis). All of this information was extracted from individuals' electronic health records. In the case of file defects, participants were asked during interviews.

Clinical variables

The BMI and duration of the disease (the number of years passed since the time of diagnosis) were extracted from electronic health records. If the BMI of patients were not measured in last month, the BMI of them were measured.

Diabetes distress

Diabetes distress scale (DDS) was used to measure the distress of the participants. This scale has been developed by Polonsky *et al.*[26] It includes 17 items. DDS evaluates the patient's status in four subscales of emotional burden, physician-related distress, dietary distress, and interpersonal distress. The patients express their opinions under each item, indicating how annoying each item was for them. The items are rated under a 6 point Likert scale (1: not a problem, 2: a slight problem, 3: a moderate problem, 4: somewhat serious problem, 5: a serious problem, 6: a very serious problem) and scoring is done by dividing the sum of all items scores by 17. The minimum and maximum scores for this scale are 1 and 6, respectively. If the result be equal to or greater than 3, it indicates the presence of distress.[27] The psychometric properties of the Persian version of DDS has been evaluated by Baradaran *et al.*[28] and its validity has been approved with the known groups method. The Cronbach's alpha higher than 0.8 was obtained for each of its four subscales.

Knowledge about diabetes

To measure participants' knowledge about diabetes, the questionnaire by Davoodi *et al.*[29] was used. This questionnaire includes 23 items, estimating people's knowledge about symptoms of increase or decrease of blood sugar, healthy and harmful foods, symptoms of diabetes, effective factors on controlling diabetes, complications of diabetes, and problems arising from lack of control of blood sugar. Each item has three choices of right (1 score), wrong (0 score), and I don't know (0 score). The minimum and maximum scores in this questionnaire are 0 and 23, respectively. A score of 15 or higher is considered sufficient knowledge.

Self-efficacy about diabetes

Diabetes Empowerment Scale (DES-28) was used to measure participant's self-efficacy. This scale, has 28 items and designed by Anderson *et al.*[30] DES-28 evaluates self-efficacy in 3 subscales of "psychological aspects of diabetes," "assessing dissatisfaction and readiness to change," and "achieving the goals of diabetes management." The items in this scale are graded according to the 5-point Likert method (5: strongly agree, 4: agree, 3:neutral, 2: disagree, and 1: strongly disagree). The score in this scale is obtained by summing all the items and dividing it by 28. Thus, the minimum and maximum scores are, respectively, 1 and 5 in this scale. A higher score indicates greater self-efficacy. A score of 3 or higher was defined as sufficient self-efficacy in the current research.[31] Tol *et al.*[32] adapted this scale in Persian. Validity of the Persian version of this scale has been confirmed through criterion validity ($r = 0.7$), and the interclass correlation coefficient was 0.76.

Attitude toward diabetes

The third version of the Diabetes Attitude Scale (DAS-3) designed by Anderson *et al.*[33] was applied to measure the participants' attitude toward diabetes. This scale has 33 items, evaluating the attitude of patients toward diabetes. Scoring in this scale was also based on the 5-point Likert method (5: strongly agree, 4: agree, 3: neutral, 2: disagree, 1: strongly disagree), in which the sum of all the scores are divided by 33. The minimum and maximum scores in this scale are 1 and 5, respectively. A higher score means a better attitude. The Farsi version of this scale was evaluated and verified by Mahjouri *et al.*[34] The concurrent validity of the scale was examined and proved through the correlation of HbA1C level and the DAS-3 scale ($r = –0.86$). Moreover, Cronbach's alpha was 0.78 and even more for all of the subscales.

Analysis

The software SPSS-22 (Statistical Package for the Social Sciences version 22.0)[1] was used for statistical analysis. To describe the data, descriptive statistics such as number, percentage, mean, and standard deviation were used. The Kolmogorov–Smirnov test was applied to investigate normality of data distribution and to identify the association of sociodemographic variables and also the other independent variables with DD; independent samples *t* test was used for continuous data and Chi-square for categorical variable. Then, multiple regression analysis was used to determine the independent relationship of the variables and control their mutual effects. In addition, the significance level was defined as $P < 0.05$.

Results

A total of 519 subjects out of 553 eligible patients consented to participate in the study (response rate: 93.9%). Reasons

¹SPSS (Version 22.0, IBM SPSS, IBM Corp, Armonk, NY, USA)

for refusing to participate were that the patient was not consent (19 subjects), was busy (5 subjects), did not reply calls (8 subjects), or other unknown reasons (2 subjects). The mean age of the participants was 69.39 ± 6.78. From the participants, 276 were female (53.2%) and 243 were male (46.8%). The majority of the participants fell in the age group 60–69 years (57.8%), illiterate (45.1%), married (70.7%), housewives (45.7%), with BMI ≥25 (75%), and disease duration under 10 years (80.3%). The mean score of knowledge, attitude, and self-efficacy were 14.40 ± 2.65, 3.00 ± 0.76, and 2.30 ± 0.66, respectively [Table 1].

The results showed that there is significant relationship between DD and gender ($P < 0.001$), marital status ($P = 0.006$), BMI ($P = 0.024$), and disease duration ($P = 0.020$). The mean score of attitude among patients with and without DD was 2.81 ± 0.74 and 3.18 ± 0.74, respectively ($P < 0.001$). Also, the mean score of self-efficacy among patients with and without DD was

Table 1: Characteristics of participants, *n*=519

Variables	*n* (%)/mean±SD [min-max]
Age	
60-69	300 (57.8)
70-79	174 (33.5)
≥80	45 (8.7)
Gender	
Female	276 (53.2)
Male	243 (46.8)
Marital status	
Married	367 (70.7)
Divorced/widow	152 (29.3)
Education	
Illiterate	234 (45.1)
Elementary	121 (23.3)
Mid/high-school	79 (15.2)
Diploma	60 (11.6)
College	25 (4.8)
Occupation	
Employed	93 (17.9)
Retired	170 (32.8)
housewives	237 (45.7)
Unemployed	19 (3.7)
BMI	
<25	130 (25.0)
≥25	389 (75.0)
Duration of DM	
<10 years	417 (80.3)
≥10 years	102 (19.7)
Diabetes distress	
Yes	252 (48.6)
No	267 (51.4)
Knowledge	14.40±2.65 [10-21]
Attitude	3.00±0.76 [1.0-5.0]
Self-efficacy	2.30±0.66 [1.10-5.0]

2.18 ± 0.61 and 2.41 ± 0.70, respectively ($P < 0.001$). On the contrary, no significant association was found between DD and age ($P = 0.100$), employment status ($P = 0.799$), education level ($P = 0.091$), and the level of knowledge ($P = 0.844$) [Table 2].

To control the mutual effects of variables on each other, multiple logistic regression analysis was used. The results showed that being female (OR = 1.688, 1.138–2.504), being widowed or divorced (OR = 1.629, 1.058–2.508), being overweight or obese (OR = 1.629, 1.057–2.511), being under 10 years in disease duration (OR = 1.721, 1.057–2.801), attitude (OR = 0.590, 0.447–0.778), and self-efficacy (OR = 0.658, 0.480–0.903) were predictors of DD [Table 3].

Discussion

This study was conducted with the aim of investigating the prevalence of DD and its related factors among older adults in Qom. The prevalence rate of DD was 48.6 in this study. Factors of gender, marital status, BMI, duration of

Table 2: Univariate analysis of factors associated with diabetes distress, *n*=519

Variables	Distress (%)/mean±SD		*P*
	No	Yes	
Age			
60-69	164 (61.4)	136 (54.0)	0.100
70-79	78 (29.2)	96 (38.1)	
≥80	25 (9.4)	20 (7.9)	
Gender			
Female	122 (45.7)	154 (61.1)	**<0.001**
Male	145 (54.3)	98 (38.9)	
Marital status			
Married	23 (76.0)	164 (65.1)	**0.006**
Divorced/widow	64 (24.0)	88 (34.9)	
Education			
Illiterate	119 (44.6)	115 (45.6)	0.091
Elementary	53 (19.9)	68 (27.0)	
Mid/high-school	41 (15.4)	38 (15.1)	
Diploma	39 (14.6)	21 (8.3)	
College	15 (5.6)	10 (4.0)	
Occupation			
Employed	51 (19.1)	42 (16.7)	0.799
Retired	87 (32.6)	83 (32.9)	
Housekeeper	118 (44.2)	119 (47.2)	
Unemployed	11 (4.1)	8 (3.2)	
BMI			
<25	78 (29.2)	52 (20.6)	**0.024**
≥25	189 (70.8)	200 (79.4)	
Duration of diabetes			
<10 years	204 (76.4)	213 (84.5)	**0.020**
≥10 years	63 (23.6.8)	39 (15.5)	
Knowledge	14.43±2.59	14.38±2.73	0.844
Attitude	3.18±0.74	2.81±0.74	**<0.001**
Self-efficacy	2.41±0.70	2.18±0.61	**<0.001**

the disease, attitude, and self-efficacy were found to be predictors of DD.

In the developed countries, different studies have reported the prevalence rate of DD ranging from 25% to 51%.[8,27,31,35-37] Findings of a systematic review, which analyzed over 50 studies, showed that the prevalence of DD was approxmately 36% on average in adults with T2D.[6] The prevalence rate of DD in this study is higher than that seen in most other studies. To interpret this finding, it can be mentioned that overall mental health status of older adults in Iran is poor.[38,39] Another reason may be the fact that less attention is paid to mental aspects of diabetes in Iran compared to the physical and medical aspects of it, which have receive more consideration.[40]

This study showed that being female is a predictor for DD. Previous studies indicated that women are at more risk of depression and DD.[31,41] It seems that women are more inclined to express their anxiety and depression and receive emotional support. They talk more about concerns. Also, women are more likely than men to seek counseling that this is resulting in more diagnosis of women suffering from DD.[42,43] Men usually consider expressing their anxiety and distress as a weakness, thus do not come up with clear answers about their stresses.[44] As a result, they are less diagnosed with DD.[31] Another reason explaining this difference is the reported higher willingness in men to use problem-solving strategies than in women. This, in turn, lowers their stress and anxiety.[41]

Various studies have pointed to overweight and obesity as another factor related to DD.[5,15,27] This study also confirmed this association. Seemingly, overweight or obese people have less physical activity and constantly receive warnings from their physician and health staff to have more serious control over their diet. These warnings in turn may lead to distress. In other words, the patients with obesity often give educational recommendation about risk of the obesity. Therefore, it can be stressful for them.[45]

Having under 10 years in disease duration has been recognized as a risk factor in DD[15,35] and depression.[46] This study also showed that the risk of DD in the patients with less than 10 years in disease duration was higher than those with disease duration of more than 10 years. It is interesting that in spite of increased complications of T2D during the second decade of disease, distress level decreases. The reasons seem to be better adaptation of the patient to necessary life changes and increased patient's skills in controlling diabetes.[47] In Iran, the system of registering chronic diseases is new, and the history of diabetes screening goes as far as near 10 years which makes the conclusion about the relation between disease duration and DD difficult.

According to the logistic regression model, attitude and self-efficacy of the patients were strong predictors

Table 3: Multiple analysis of factors associated with diabetes distress, *n*=519

Variables	β	SE	Wald	Adjusted OR	95% CI	*P*
Gender						
Female	0.524	0.201	6.767	1.688	1.138-2.504	0.009
Male				1		
Marital statues						
Married				1		
Divorced/widow	0.488	0.220	4.903	1.627	1.058-2.508	0.027
BMI						
<25				1		
≥25	0.488	0.221	4.885	1.629	1.057-2.511	0.027
Duration of diabetes						
<10	0.543	0.249	4.772	1.721	1.057-2.801	0.029
≥10				1		
Self-efficacy	-0.418	0.161	6.739	0.658	0.480-0.903	0.009
Attitude	-0.528	0.141	13.988	0.590	0.447-0.778	<0.001
Constant	1.256	0.541	5.392	3.510		<0.001

Method=Backward conditional, β=Logistic regression coefficient, SE=Standard error, OR=Odds ratio, CI=Confidence interval

for DD. Other studies have independently reported the relationship between self-efficacy[15,48] and attitude.[49] Based on the results of regression analysis in this study, patients' attitude toward diabetes, compared with their self-efficacy, played a stronger role in predicting the DD. Patients with more positive attitude were at lower risk of DD. Attitude is a major factor in determining health behaviors[47] and in older adults, attitude is reported to be related to vulnerability and the more negative the attitude is, the more vulnerable the aged will be.[50] Moreover, it is indicated that negative attitude of patients has direct relation with the emergence of complications and consequences of the disease[51] and positive attitude helps the elderly with adapting and getting along with the disease.[52]

According to the social learning theory, adoption of health behaviors for a long time needs determination, self-confidence and ability of the patient that all of these factors refer to self-efficacy concept.[53,54] Positive self-efficacy plays a significant role in self-caring, solving conflicts, interpersonal relations, doing physical activities, controlling blood pressure, and observing diet.[55] Self-efficacy is one of the main cores of behavior change, being highly correlated with DD.[56] Patients' self-efficacy is significantly related to controlling blood sugar, and especially, reducing HbA1c, resulting in reduction of patients' anxiety and distress.[15] Self-efficacy is improvable, and can be enhanced by applying appropriate strategies such as education.[57]

This study had some limitations. The first, we could not measure some important variables including HbA1c, social participation, loneliness, social support, type of the used medications, and family history. All these factors may potentially affect DD. They may also have mutual effects on the independent variables in this study. The second limitation was the type of study. As this study was cross-sectional, it is not possible to precisely judge the causative association between distress and attitude. For a more reasonable conclusion about the chronological order of the patient's attitude and DD, longitudinal studies should be conducted.

Conclusions

DD is a significantly prevalent problem in the T2D patients residing in the city of Qom, and thus, it necessitates a more serious consideration. In health planning for older adults with T2D, some groups are more at risk than others Such as women, the widowed or divorced elderly, the overweight or obese elderly, and the elderly with disease duration of below 10 years. In addition, older adults with weaker attitude and lower self-efficacy are more at risk of affecting by DD. So, it can be recommended that health care planners and providers need to identify at risk groups and work on their promoting attitude and self-efficacy to lower the effects of diabetes on mental health of the patients and prevent DD and its consequences. Attitude depends on cultural and social issues. Therefore, steps can be taken to improve the attitude of these patients by involving families, friends, and even health staff.[58] Moreover, self-efficacy can be enhanced by applying low-cost plans and strategies such as training and creating self-assisting groups.

Ethical policy and institutional review board statement

This research was conducted upon receiving the ethics code IR.USWR.REC.1397.122 from the ethics committee of the University of Social Welfare and Rehabilitation Sciences of Tehran. In addition, required licenses were obtained from Qom University of Medical Sciences prior to sampling. During the research, the principles of Declaration of Helsinki were observed. A letter of informed consent was received from every participant.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/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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