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AN USEFUL TOOLF FOR DIABETES EMOTIONAL DISTRESS ASSESSMENT: VALIDATION OF THE ROMANIAN VERSION OF DIABETES DISTRESS SCALE

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Abstract

Background and Aims: *The aim of the present study was to validate the Diabetes Distress Scale (DDS) on Romanian diabetes patients.* **Material and Methods:** *A total number of 529 type 1 and type 2 diabetes outpatients were included in the study. Exploratory and confirmatory factor analyses were used to assess the construct validity, Cronbach's Alpha for internal consistency and Pearson's correlation for predictive properties.* **Results:** *Distress level was lower in Romanian diabetes patients when compared to other studies. Model fit for the scale was moderate. The four factor structure of the original scale was maintained, with a good internal consistency for the entire scale (0.824) and for the four subscales: emotional burden (0.775), distress related to the physician (0.798), distress related to diabetes regimen (0.708), and interpersonal distress (0.733). Regarding predictive properties, DDS-Ro was positively correlated to depressive symptoms measured with the Beck Depression Inventory ($r = 0.415$, $p < 0.05$) and to diabetes self-care activities measured with the Summary of Diabetes-Self-Care Activities, with the strongest correlation between diabetes regimen distress and physical activities ($r = - 0.358$, $p < 0.01$).* **Conclusions:** *DDS-Ro has good psychometric properties in Romanian diabetes patients and can be used when diabetes emotional impact is assessed.*

key words: *diabetes distress, depression, Romania*

Background and Aims

Diabetes distress is a construct which is gaining more importance in predicting diabetes outcomes and in explaining depressive symptoms [1] in diabetes with respect to glycemic control and self-care activities [2,3] and medication adherence [4]. The Diabetes Distress Scale (DDS) is a widely used questionnaire that assesses diabetes specific emotional distress [5] regarding emotional diabetes burden, physician, diabetes management and interpersonal relationship distress. The scale has been previously translated into different languages [6,7] but, to our knowledge, so far there is no data publication of its psychometric characteristics for Romanian diabetes patients. In consequence the aim of the present study was to examine the psychometric properties of the Diabetes Distress Scale on Romanian (DDS-Ro) diabetes patients.

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Material and Methods

Participants

Both type 1 and type 2 diabetes subjects, aged 18 or older and fluently speaking Romanian were included in the study. Patients with active anxiety, dementia, substance abuse or psychotic diseases were excluded. Before filling in the questionnaire, the patients were informed of the aim of the study and the possibility to withdraw at any time. They gave written consent and if they could not complete the questionnaire by themselves, a trained person was provided for them. A total number of 650 outpatients from the Clinical Centre for Diabetes, Nutrition and Metabolic Diseases – Emergency Clinical County Hospital Cluj were recruited in the study at baseline. Of these, 100 did not complete all the items of the questionnaires and 21 refused to give access to their medical records. Thus, finally a total sample of 529 patients was enrolled for the validation analysis. Data were collected between 2013 and 2015.

Measurements

Demographical characteristics like age, sex, education, social status were self-reported. Medical characteristics were collected from the medical charts of the patients. These included type and duration of diabetes, diabetes treatment, diabetes complications and the most recent glycated hemoglobin (HbA1c). No HbA1c older than one year was taken into account.

Questionnaires

DDS is a 17-items questionnaire [5] which assesses diabetes emotional distress. To score the items, a 6 point Likert scale is used starting from 1 (no problem) to 6 (serious problem). DDS includes four dimensions regarding physician related distress (e.g. "Feeling that my doctor doesn't know enough about diabetes and diabetes care."), regimen related distress (e.g. "Not feeling motivated to keep up my diabetes self-management."), interpersonal distress (e.g. "Feeling that friends or family don't give me the emotional support that I would like.") and distress due to emotional burden (e.g. "Feeling overwhelmed by the demands of living with diabetes."). For the final score, the mean score of the 4 dimensions is calculated. Also, a separate score for each of the four dimensions can be calculated. The Romanian version of the scale along with the scoring instructions can be requested from the correspondence author.

Beck Depression Inventory II (BDI-II) was used to assess depressive symptoms [8,9]. BDI-II consists of 21 items rated on an intensity scale from 0 (low intensity) to 3 (highest intensity) with a maximum score of 63. Beside the total score, BDI-II has the possibility to calculate the score of its two dimensions: affective-somatic and cognitive. For this study only the total score of the inventory was used.

Summary of Diabetes Self-Care Activities (*SDSCA*) [10] is a multidimensional questionnaire of diabetes management. It consists of measurements regarding diet, physical activities, blood glucose self-monitoring, foot care and smoking. The numbers of days per week, from 0 to 7, in which the patient is performing the recommended self-care activities, are used to evaluate the illness management. The higher the number of days per week, the better the adherence to self-care. The scores for six dimensions of the self-care activities can be calculated: general and specific diet, physical activities, blood glucose testing, foot care and smoking.

Statistical analysis methods

In order to translate the scale to Romanian, two bilingual professionals performed the translation. First they translated the DDS from

English to Romania and then, both Romanian versions were retranslated into English. The Romanian version that corresponded best with the English version was chosen. For demographical and clinical data of the participants, descriptive statistics like frequency, mean and standard deviation were used.

The factor structure of the DDS-Ro was analyzed first by exploratory factor analysis, using principal axis factoring for factor extraction and promax rotation for oblique or correlated factors. The number of the factors was determined based on several criteria: a) the Eigenvalue ≥ 1, b) percentage of variance explained by the factors, c) factors showed by the screen plot to have significant common variance. The number of participants in our study was >350 and a cut-off value of 0.3 was used for items loading on factors [11]. Second, we used confirmatory factor analysis to test the forced four, three and one factor fit of a predefined model. Root mean square error of approximation (RMSEA) (if possible to be less than 0.08) and comparative fit index (CFI) (if possible to be at least 0.93) were used to determine the model fit.

To establish internal consistency for DDS-Ro, we used Cronbach's alpha and split-half analysis. For Cronbach's alpha, values ≥ 0.70 [12] were regarded as acceptable. In order to examine the predictive validity, Pearson's correlation was used to assess the relation between BDI-II, SDSCA and DDS-Ro. A p value < 0.05 was considered significant.

Results

Demographic and clinical data

The majority of the participants were women (56.1%) diagnosed with type 2 diabetes (93.6%). Neuropathy was the most frequent complication (7.8%) and 53.9% scored below 2 at DDS-Ro. From our entire sample of 529 participants, 21.9% had a previous depressive episode with only 10.2% of the entire sample receiving treatment for depression. Current depression was found in 14 participants. Patient characteristics are displayed in Table 1.

Table 1. Characteristics of the study group.

Sex: number (%)	
Female	301 (56.9 %)
Male	228 (43.1%)
Age (years), mean (SD)	10.17 (60.04)
Diabetes: number (%)	
Type 1	34 (6.4%)
Type 2	495 (93.6 %)
Education: number (%)	
Elementary	32 (6%)
Secondary	12.7% (67)
School of Trades	47 (8.9%)
High School	102 (19.3%)
Undergraduate	180 (34.0%)
University	99 (18.7%)
Diabetes duration (years), mean (SD)	10.09 (7.61)
Treatment: number (%)	
Medication	298 (56.3%)
Insulin + Medication	84 (15.9%)
Insulin only	147 (27.8%)
Insulin (years), mean (SD)	3.64 (6.96)
Diabetes complications: number (%)	
No complications	433 (81.9%)
1 complication	70 (13.2 %)
2 complications	22 (4.2%)
3 complications	1 (0.2%)
HbA1c (%), mean (SD)	7.67 (1.76)
DDS-Ro, mean (SD)	1.98 (0.72)

Values represent frequencies (%), mean and standard deviation (SD)

Validity and reliability

Exploratory factor analysis showed best results for four-factor model, with Eigenvalue ranging from 1.07 to 4.88 and with a percent of variance explained by the factors of 57.46%. As showed in Table 2, the factor loadings ranged from 0.321 to 0.862, with the lowest value being for item 16 „Not feeling motivated to keep up my diabetes self management". The CFI= 0.882 of confirmatory factor analysis was below the acceptable level, indicating moderate fit (REMSEA = 0.073). All of the model parameters were significant at the p < 0.05 level.

Table 2. Exploratory factor analysis showing factor loadings of the items of DDS-Ro.

	Component			
	1	2	3	4
1. Feeling that diabetes is taking up too much of my mental and physical energy every day.		.752		
2. Feeling that my doctor doesn't know enough about diabetes and diabetes care.	.728			
3. Feeling angry, scared, and/or depressed when I think about living with diabetes.		.673		
4. Feeling that my doctor doesn't give me clear enough directions on how to manage my diabetes.	.862			
5. Feeling that I am not testing my blood sugars frequently enough.			.543	
6. Feeling that I am often failing with my diabetes routine.			.807	
7. Feeling that friends or family are not supportive enough of self-care efforts (e.g. planning activities that conflict with my schedule, encouraging me to eat the "wrong" foods).				.572
8. Feeling that diabetes controls my life.		.756		
9. Feeling that my doctor doesn't take my concerns seriously enough.	.788			
10. Not feeling confident in my day-to-day ability to manage diabetes.			.394	
11. Feeling that I will end up with serious long-term complications, no matter what I do.		.376		
12. Feeling that I am not sticking closely enough to a good meal plan.			.655	
13. Feeling that friends or family don't appreciate how difficult living with diabetes can be.				.729
14. Feeling overwhelmed by the demands of living with diabetes.		.637		
15. Feeling that I don't have a doctor who I can see regularly enough about my diabetes.	.463			
16. Not feeling motivated to keep up my diabetes self management.			.321	
17. Feeling that friends or family don't give me the emotional support that I would like.				.817

To test the reliability, Cronbach's Alpha was calculated separately for the entire scale and for the four subscales. Table 3 indicates that both Cronbach's Alpha (0.824) and split-half (0.840) implies good internal consistency for the scale.

Table 3. Internal consistency for entire DDS-Ro and for the four dimensions of the scale.

Subscales	**Cronbach's Alpha**
Emotional - F1	0.775
Physician - F2	0.798
Management - F3	0.708
Interpersonal relationship - F4	0.733
DDS-Ro Total	0.824
	Split-half
DDS-Ro Total	0.840

Regarding the predictive construct validity, DDS-Ro was proved to be correlated with both depression and diabetes self-care activities at a significant p level< 0.05. Details are displayed in Table 4. Also, a post-hoc analysis revealed an association between diabetes distress and HbA1c levels.

Discussions

Our sample consisted mainly of type 2 diabetes outpatients, treated both with insulin and oral medication, with fair glycemic control according to the ADA clinical practice recommendations [13]. The level of distress of Romanian diabetes patients was lower when compared with the cut-off points established by Polonsky [14], suggesting that diabetes is not perceived as a distress factor in day-to-day life. One possible explanation might be that the majority of the participants were in fair glycemic control, were mainly treated with oral anti-diabetic drugs and most often had no diabetes complications. Therefore diabetes was not perceived as a threat to their lives or daily activities. This can be sustained by the fact that these patients do not require daily self-monitoring of blood glucose and, as a consequence, diabetes does not interfere too much with day-to-day life.

The four factor structure identified in our study was similar to the one reported by Polonsky [5]. Emotional distress related to diabetes is evaluated by the emotional burden factor which refers to emotions like fear, worries, felling overwhelmed by diabetes, and feeling that diabetes controls one's life. Feeling the need to see the diabetologist more often, to receive more information about the illness, to be

listened and understood by the doctors and to get the needed social support from family and friends are two other dimensions measured by the questionnaire: physician related distress and, respectively, interpersonal distress. The last dimension assessed by the scale is the regimen related distress which refers to difficulties to adhere to self-care behaviours like self-monitoring, diet, self-efficacy and motivation to diabetes management.

Table 4. Pearson correlation coefficient for DDS-Ro, BDI-II and SDSCA with type 1 and type 2 diabetes; Pearson correlation between DDS-Ro and HbA1c.

	DDS-Ro Total	DDS-Ro Physician	DDS-Ro Management	DDS-Ro Relationship	DDS-Ro Emotional
BDI-II	0.415*	0.135**	0.137**	0.307**	0.510*
SDSCA total					
SDSCA general diet	-0.165**	-	-0.325**	-	-
SDSCA specific diet	-0.122 **	-	-0.160*	-	-
SDSCA physical activity	-0.248**	-	-0.358**	-0.135**	-
SDSCA self-monitoring	-0.126**	-	-0.214**	-	-
SDSCA foot-care	-	-	-	-	0.110*
SDSCA smoking	-	-	-	-	-0.111*
HbA1c	0.118*	-	0.100*	.	0.102*

*p<0.05; ** p<0.01

All items had a high factor lading, except the ones regarding motivation towards diabetes management, confidence in day-to-day ability to manage diabetes and developing long-term diabetes complication. In the Thai version of the DDS, these items were distributed to the same factor named „emotional and regimen-related burden" [15] while in the Norwegian version, the item regarding long-term complication was allocated to the regimen distress instead of emotional burden [16]. In the Romanian version, although these items had low factor loads in general, the highest loads were in the original factors. This can be explained by cultural differences from other countries, differences that are related to the medical system, physician attitude towards illness and also the fact that the majority of our patients were in good health, with the need to perform low self-care activities. In Romania, like in other Eastern – European countries, there is a transition from passive implication in illness management to an active implication. Due to the health insurance system and medical system, diabetes patients rely mostly on medical provider to take decisions, guide illness management and to motivate them into health-care behaviours [17].

DDS-Ro also demonstrated good predictive outcomes related to depressive symptoms [18]. Emotional burden of diabetes and distress regarding relationship with family and friends were the highest correlated with depression, suggesting that diabetes has a negative impact on the perceived social life of a person, which can develop depressive symptoms. Regarding health-care behaviours, DDS-RO has strongest correlation with diet, physical-activity and self-monitoring [19].

Consistent with other published data, DDS-Ro was positively correlated with poorer diabetes control expressed by HbA1c values [20,21]. In people with diabetes, depressive symptoms are correlated with poorer self-care behaviours [22] and poor diabetes control [23]. But when diabetes distress is added to the equation, depressive symptoms lose their significance [24], suggesting the difference between the two concepts of depression and distress. As in previous reports, emotional burden of diabetes and diabetes regimen-related

distress proved to have the strongest correlation with glycemic control [25].

Overall, the four factor structure of the DDS-Ro can discriminate between diabetes-distress components and predict poorer self-care activities, poorer glycemic control and depressive symptoms [26]. Due to its good psychometrical properties, the scale can be used by diabetes practitioner to assess diabetes-related emotional distress. Nevertheless, more research on a larger population and different settings is necessary in order to sustain the weaknesses and strengths of the scale.

Conclusions

The results of our current study suggest that the Romanian version of the DDS-Ro has satisfactory psychometric properties and that it can be used as a screening instrument to investigate diabetes emotional distress in people with diabetes. The analysis performed showed good validity, high internal consistency for both components for the entire scale and for all four sub-domains, and high split-half reliability.

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