Diabetes Distress and Associated Factors in Patients with Diabetes Mellitus in South East Nigeria

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Keywords

Prevalence · Diabetes distress · Screening · Severity · Associated factors · Management

Abstract

Background: Diabetes distress (DD) is a common worldwide problem in diabetic patients irrespective of age and type of treatment. In the DAWN 2 study (Diabetes Attitudes, Wishes, and Needs), DD was reported by 44.6% of participants. **Objectives:** The purpose of this study was to assess the prevalence and level of DD and its associated factors among adult diabetic patients in South East Nigeria. **Methods:** The present study was cross-sectional and descriptive. Patients attending the adult diabetes clinic were enrolled. The questionnaire was administered by the investigators. All patients were eligible. Their demographic and clinical data were obtained. They were screened for DD using the DD Scale (DDS)-2 and DDS-17. Data were tabulated and analyzed using SPSS version 21. **Results:** There were 110 subjects (38 males and 72 females), aged 36–85 years (60.5 ± 10.0). Only 9 (8.2%) had diabetes mellitus (DM) type 1, while the rest had type 2 DM. Twenty-five subjects (22.7%) were on insulin injection. Hypertension was coexistent in 72%, and they were prescribed

3–10 medications (5.9 ± 1.5) at the time of assessment. The male and female subjects were comparable. Moderate to severe DD was present in 51.9% (DDS-17). The average scores were for DDS-2, 3.1; DDS-17, 2.3; emotional burden, 2.9; physician-related distress, 1.4; regimen-related distress, 2.5, and interpersonal distress, 2.2. Distress was significantly associated with a younger age, T1DM, longer duration of diabetes, use of insulin injection, and HbA_{1c} level. **Conclusion:** DD is a common consequence of living with diabetes and impairs diabetes self-care behavior and glycemic control. Active screening for DD should be an integral part of diabetes care. Diabetes self-management education and support should be implemented at diagnosis and as needed thereafter, especially when DD is diagnosed.

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Introduction

People with diabetes are at increased risk for depression, anxiety, eating disorders, cognitive dysfunction/dementia, diabetes distress (DD), psychological insulin resistance (reluctance or refusal to initiate insulin therapy), and persistent fear of hypoglycemia [1–5]. The

presence of psychiatric comorbidities and DD is associated with reduced diabetes self-care and quality of life [1–6].

Definition

DD or diabetes-related distress is a form of emotional distress, which is specific to diabetes and reflects the emotional response to a demanding illness. It encompasses the significantly negative emotional reactions to all aspects of diabetes and diabetes care. This includes: DM diagnosis, threat of complications, self-management demands (testing and monitoring blood glucose level, compliance with dietary regimen, and engaging in regular physical activity), treatment, or unsupportive social structures surrounding diabetes [7, 8]. DD is a rational response to the demands of a challenging long-term illness and is not considered a psychopathology. It differs from major depressive disorder in being content rather than symptom specific. While DD symptoms are similar to those of depression, they are not severe enough to meet the diagnostic criteria for major depressive disorder [7–9].

Prevalence

DD is a common worldwide problem in people with diabetes mellitus of all ages and has been demonstrated across various populations and cultures. It affects type 1 (T1DM) or type 2 DM patients (T2DM) whether on insulin injection or not. In the DAWN 1 study (Diabetes Attitudes, Wishes, and Needs) [10], DD was reported by 41% of the participants and in DAWN 2 by 44.6% (17.2–67.6) [11]. In the same study, supporting a relative with diabetes was perceived as a burden by 35.3% (10.6–61.7%) [11, 12].

Screening for DD

DD can be assessed using one of several patient-reported outcome measures. Two scales are accepted as statistically sound measures of DD [13]: the Problem Areas in Diabetes (PAID) scale [14, 15] and the DD Scale (DDS) [16, 17]. Despite its strengths, the PAID scale had some drawbacks, including the absence of subscales to distinguish the various elements of DD and lack of questions addressing patients' experience with their health care providers. This prompted the development of a 17-item questionnaire to measure DD (DDS-17). The DDS-17 distinguishes 4 main subscales from the principal term, which include: emotional burden (EB, 5 items), physician-related distress (PRD, 4 items), regimen-related distress (RRD, 5 items), and interpersonal distress (ID, 3 items), which represent different areas of potential diabetes-specific distress. DDS-17 uses a Likert scale with each item scored

from 1 to 6 reflecting the distress experienced over the last month: 1 (not a problem), 2 (a slight problem), 3 (a moderate problem), 4 (a somewhat serious problem), 5 (a serious problem), and 6 (a very serious problem). Total possible scores for DDS-17 will be 17–102 (average 1–6). Thus, the actual average scores for the DDS-17 and their subscales yield 3 patient subgroups: little or no distress, <2.0; moderate distress, 2.0–2.9; high distress, ≥3.0. A brief version; the DDS-2, which is a 2-item instrument, was also developed for the initial screening of DD [18]. The same grading is used for scoring the DDS-2.

Materials and Methods

Study Objectives

The purpose of this study was to assess the prevalence and level of DD and its associated factors among adult diabetic patients attending a teaching hospital in South East Nigeria. The findings of this study will help to develop appropriate policy for prevention, control, and rehabilitation of patients with DD. The study also sought to establish how DDS-2 correlated with DDS-17 in the local population.

Study Design

The study was cross-sectional and descriptive and was conducted at the University of Nigeria Teaching Hospital Enugu, a premier teaching hospital in the South East of Nigeria. All patients were eligible for recruitment. However, those too ill, confused, or feeble were excluded. Consecutive patients with DM attending the outpatient adult diabetes clinic were recruited into the study. Their personal, anthropometric, and laboratory data were recorded.

Screening for DD

The DD level was assessed using DDS-17 and DDS-2. The questionnaire was administered by the investigators. The results were tabulated, and the DD level calculated for each subject and classified as previously described.

Statistical Analysis

Data were analyzed using SPSS version 21 (SPSS, Inc., Chicago, IL, USA). Descriptive statistics were used to describe the population, and χ^2 test and Pearson correlation coefficient were used to analyze data for significant associations between variables. A p value <0.05 was considered statistically significant. The Mann-Whitney U test was used to compare the male and female scores. Point-biserial correlation was used to test the correlation between the distress scores and binary categorical variables.

Results

A total of 110 subjects were screened (38 males and 72 females). Their demographic and clinical data are presented in Table 1. All the participants were of Igbo ethnic origin. Only 9 (8.2%) were T1DM, while the rest were T2DM. For

Table 1. Basic demographic and clinical data

Total patients	110 (100%)
Males	38 (34.5%)
Females	72 (65.5%)
Diabetes mellitus	
T1DM	9 (8.2%)
T2DM	101 (91.8%)
Age, years	36–85, 60.5±10.0
T1DM	35–74, 56.11±11.27
T2DM	41–85, 60.90±9.83
Education	
None	8 (7.2%)
Primary	38 (34.5%)
Secondary	21 (19.0%)
Tertiary	43 (39.1%)
Marital status	
Married	82 (74.5%)
Widowed	25 (22.7%)
Single	3 (2.7%)
Occupation	
Professionals ¹	19 (17%)
Clerical, service ²	16 (14.5%)
Craft, trade, elementary	46 (41.8%)
Retired	29 (26.3%)
DM treatment	
Oral	85 (77.3%)
Insulin	25 (22.7%)
Hypertension	79 (71.8%)
BMI, kg/m ²	18.1–43.3, 27.4±5.1
Waist circumference, cm	61.0–129.0, 93.2±12.3
Waist/hip ratio	0.77–2.0, 0.94.5±0.13
Medications, <i>n</i>	3–10, 5.9±1.5
HbA _{1C} , %	5.2–16.4, 8.9 ±2.4

Numbers (%), ranges (min–max), and means ± SD are shown.

¹ Managers, professionals, associated professionals, technicians.

² Clerical, sales, and service workers.

the purpose of analyses, subjects were classified as having T1DM if they were diagnosed with diabetes before the age of 40 years and were treated with insulin both at diagnosis and at the time of the survey. The subjects were aged 35–85 years with a mean ± SD of 60.5 ± 10.0 years. The mean age for subjects with T1DM was 56.1 ± 11.3 years and for those with T2DM 60.9 ± 9.8 years. The duration of DM ranged from 1 to 42 years, with a mean of 10.8 ± 8.6 years (T1DM 22.4 ± 9.9 years and T2DM 9.9 ± 7.6 years). On the whole, 25 (22.7%) subjects were on insulin injection (basal and mixed insulin) in addition to oral glucose-lowering medications and appropriate diet therapy while the rest were on oral medications. Hypertension was coexistent in 72% of the subjects. The subjects were prescribed 3–10 medications (5.9 ± 1.5) at the time of assessment. The male and female subjects were comparable in their demographics

Table 2. Diabetes distress scale (DDS) scores

DDS	Males (<i>n</i> = 38)	Females (<i>n</i> = 72)	Total (<i>n</i> = 110)	<i>p</i> value
DDS-2	2.6±1.4	3.2±1.7	3.1±1.6	0.056
DDS-17	2.1±1.0	2.5±1.2	2.3±1.2	0.094
EB	2.7±1.4	3.0±1.8	2.9±1.6	0.398
PRD	1.2±0.31	1.6±0.78	1.4±.68	<i>0.001</i>
RRD	2.2±1.1	2.7±1.4	2.5±1.3	0.099
ID	1.8±1.2	2.4±1.6	2.2±1.5	<i>0.024</i>
	T1DM		T2DM	
DM type				
DDS-2	4.4±1.7		2.9±1.6	<i>0.018</i>
DDS-17	3.4±1.3		2.2±1.1	<i>0.014</i>

Means ± SD. DM, diabetes mellitus; EB, emotional burden; PRD, physician-related distress; RRD, regimen-related distress; ID, interpersonal distress. Statistically significant values are italicized.

Fig. 1. Mean diabetes distress scores.

and differed significantly only in their occupation, BMI, waist circumference and waist/hip ratio ($p = 0.030$, $p = 0.013$, $p < 0.001$, and $p < 0.001$ respectively). The overall average scores were: DDS-2, 3.1 ± 1.6 and DDS-17, 2.3 ±

Fig. 2. Grading of diabetes distress scores.

1.2 (Table 2). Average scores for T1DM were DDS-2, 4.4 ± 1.7 and DDS-17, 3.4 ± 1.3 and for T2DM, DDS-2, 2.9 ± 1.6 and DDS-17, 2.2 ± 1.1 (Table 2). The difference was statistically significant ($p = -0.018$ and $p = 0.014$, respectively). The average scores for the subscales were summarized in Table 2 and Figure 1. Moderate DD was recorded in all categories except for PRD. In ID, males recorded mild and females had moderate distress. Among the subscales, EB received the highest scores followed by RRD. PRD was the least. Males and females differed significantly in their scores for DDS-PRD ($p = 0.001$) and -ID ($p = 0.024$). Scores for the different parameters of distress were graded in terms of severity (Table 3; Fig. 2). DD (score ≥ 2 or moderate to severe distress) was present in 75.5% for DDS-2, 51.9% for DDS-17, 60.5% for EB, 17.2% for PRD, 55.4% for RRD, and 45.5% for ID. Pearson correlation was used to check the relationships between different DD scores. DDS-2 correlated strongly with DDS-17 ($r = 0.835$, $p < 0.001$), and most strongly with EB ($r = 0.859$, $p < 0.001$) as well as the other subscales: PRD ($r = 0.435$, $p < 0.001$); RRD ($r = 0.770$, $p < 0.001$), and ID ($r = 0.607$, $p < 0.001$; Cronbach's α 0.92). Further bivariate analysis was carried out to determine associations between the clinical and metabolic factors that contributed to, or were associated with, DD (age, and type, duration, and treatment of DM, presence of hypertension,

Table 3. Diabetes distress (DD) severity

	DD severity, n (%)		
	mild	moderate	severe
DDS-2	27 (24.5)	27 (24.5)	58 (50.9)
DDS-17	53 (48.2)	28 (25.5)	29 (26.4)
EB	43 (39.1)	15 (13.6)	50 (45.5)
PRD	91 (82.7)	15 (13.6)	4 (3.6)
RRD	49 (44.5)	26 (23.6)	35 (31.8)
ID	60 (54.5)	17 (15.5)	33 (30.0)

See legend to Table 2 for more information.

number of medications, HbA_{1C}, and presence of diabetic peripheral neuropathy). The results are presented in Table 4. It became evident that the effect of different clinical and health variables was not uniform. Age correlated negatively with DD in all scales and subscales except for PRD. DM type (T1DM) recorded significant distress across all the DD scales and subscales. EB had significant association with DM type and higher HbA_{1C} levels; PRD and RRD with DM type; and treatment (use of insulin) and ID with DM type (T1DM), DM treatment, and HbA_{1C} level. Elevated HbA_{1C} level was a significant association only in EB and ID.

Discussion

The prevalence of overall DD obtained by DDS-17 (52%) in this study was comparable to figures obtained by the DAWN 2 study (17.2–67.6%) [12]. Various figures have been reported from studies in different regions of the world: Sudan, 87.6% [19]; Trinidad, 56.1% [20]; Malaysia, 49.2% [21]; Bangladesh, 48.5% [22]; South Africa, 44% [23]; Canada, 39% [24]; Brazil, 31.5% [25]; and Saudi Arabia, 25% [26]. Fisher et al. [27] reported a DD prevalence of 42.1% in adults with T1DM. In this study, subjects with T1DM had significantly higher distress scores in all scales compared to those with T2DM. This is probably related to their younger age, use of insulin for treatment, and longer duration of diabetes. Patients with T1DM were younger at the time of diagnosis and may have fewer coping mechanisms than those with T2DM. Cost of medications, a more difficult therapeutic regimen, and the various social, psychological, and physical stressors faced by younger people were thus contributory [28]. The high DDS scores underscore the need for intensive support and education for them, which sadly is not always available in resource-constrained settings such as ours. The STePS (Supporting

Table 4. Relationship between mean diabetes distress scores (DDS) and health variables

	DDS-2		DDS-17		EB		PRD		RRD		ID	
	<i>r</i>	<i>p</i> value	<i>r</i>	<i>p</i> value	<i>r</i>	<i>p</i> value	<i>r</i>	<i>p</i> value	<i>r</i>	<i>p</i> value	<i>r</i>	<i>p</i> value
Age	−0.244	0.010	−293	0.002	−0.216	0.024	−0.162	0.091	−0.309	0.001	−0.309	0.001
Diabetes mellitus												
Duration	0.012	0.899	0.029	0.762	0.100	0.411	0.065	0.500	0.047	0.628	0.086	0.369
Type	−0.254	0.007	−0.277	0.003	−0.241	0.011	−0.243	0.011	−0.227	0.017	−0.271	0.004
Treatment	210	0.028	0.278	0.003	213	0.026	256	0.007	0.286	0.003	0.224	0.019
Hypertension	−0.112	0.244	−0.096	0.320	−0.050	0.607	−0.073	0.440	−0.156	0.104	−151	0.116
Duration	−0.011	0.927	−0.094	0.428	−0.059	0.615	0.135	0.250	−0.109	0.357	0.036	0.758
HbA _{1C}	157	0.181	256	0.028	231	0.047	0.065	0.584	221	0.059	244	0.036
Medication	0.030	0.809	0.010	0.934	0.075	0.550	−0.059	0.638	−0.093	0.457	−0.081	0.519
DPN	−0.057	0.798	−0.114	0.588	−0.027	0.781	−0.022	0.821	−0.009	0.926	0.054	0.572

DPN, diabetic peripheral neuropathy. See legend to Table 2 for more information.

Teens Problems Solving) study was an intensive resilience intervention program to prevent the development of DD in adolescents with T1DM, of which early results are promising [29]. In the T1-REDEEM, a randomized controlled trial to reduce DD among adults with T1DM, DD was successfully reduced using both education/behavioral and emotion-focused approaches [30]. In the same vein, Ramaj et al. [31] reported better control of diabetes and a significantly improved level of emotional distress by additional education of diabetic patients with DD. Insulin distress is a major contributor to DD [32]. T1DM and T2DM subjects on insulin injections recorded high DD (Table 4). Insulin distress is defined as an emotional response to a suggestion to use insulin, characterized by extreme apprehension, discomfort, dejection, or denial due to a perceived inability to cope with the requirements of insulin therapy [32]. In our practice, patients view suggestion of insulin use as a sign of an ominous deterioration in their condition, and it evokes considerable apprehension. EB was the dominant form of distress in most studies, as was also recorded in this report. In this study, only EB and ID were linked to higher HbA_{1C} levels. This is not surprising. Constant coping with diabetes management and fears of complications and reduced life expectancy can produce wear and tear on a patient's psyche, and thus impair quality of life and self-care. Analysis of the scores of the subscales underscores the point that while average scores may be within normal limits, the subscales may reveal areas of significant distress warranting attention (Table 4). Scores for PRD were the lowest. The subjects were generally satisfied with their caregivers. PRD was almost always related to their being unable to see the physician of their choice. This was seen more in females, who had sig-

nificantly higher PRD scores than males ($p = 0.012$) and in T1DM. Psychological attachment to a specific physician may be more common in females than males, though this observation will need to be further verified. For T1DM, it may be related to the physicians they have bonded with over the many years they have been attending a hospital. In a report by Slean et al. [33], better doctor communication behavior and higher trust in physicians was associated with lower EB among patients with diabetes. The DDS-2 correlated strongly with both DDS-17 and the subscales. The correlation was strongest with EB. This is quite significant, as the average EB score was the highest of all the subscales for the study subjects. This is indicative of the DDS-2 as a good tool for the initial assessment of DD as it correlated very strongly with EB, the dominant source of DD. The usual demographic and health factors associated with DD were reproduced in this study. It has been noted that diabetes self-management in Sub-Saharan Africa is generally poor and a serious threat to glycemic control. Self-monitoring of blood glucose, physical activity, and risk reduction behavior are insufficient [34, 35]. A report by Ogbera and Adeyemi-Doro [35] in Nigeria concluded that psychosocial factors directly influence glycemic control and diabetes self-care habits. Current guidelines on diabetes management incorporate screening for DD [36]. Screening should be done at diabetes diagnosis, during regularly scheduled management visits, during hospitalizations, with new onset of complications, or when problems with glucose control, quality of life, or self-management are identified [37]. The DDS-2 is useful for the initial DD screening. Distressed persons can then proceed to the full DDS-17 assessment. Moderate to high DD scores, as well as individual items in the subscales

identified as problem areas, present the focus for a therapeutic conversation, which simply means listening to and showing an understanding and awareness of the psychosocial and emotional issues associated with diabetes [13]. Individuals with DD should receive diabetes self-management education and support (DSME/S) [37] and should be followed up to determine improvement in their scores. The incorporation of DD screening and management into national diabetes care guidelines is significant.

Emotional well-being is an important part of diabetes care and self-management. DD is a common consequence of living with diabetes and impairs diabetes self-care behavior and glycemic control. Health practitioners should be well aware of this. Active screening for DD should be an integral part of diabetes care. DSME/S is fundamental for implementing and sustaining coping skills and behaviors needed to self-manage diabetes on an ongoing basis. The recommendation of the guidelines that individuals with diabetes receive DSME/S especially at diagnosis and as needed thereafter is a good starting point.

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Statement of Ethics

The study protocol was approved by the UNTH Research Ethics Committee. The subjects gave informed consent.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

All the authors were involved in the concept and design of the study, acquisition, analysis, and interpretation of data, drafting and revision of the article, and in the final approval of the version to be published.

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