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ORIGINAL RESEARCH

Diabetes-Related-Distress and its Relationship with Glycaemic Control Among Type 2 Diabetes Mellitus Patients Attending a Specialty Clinic in Lagos, Nigeria

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Abstract

Background: Diabetes Mellitus (DM) is a chronic metabolic disease with various complications throughout its course. The presence of emotional burden in diabetes disease, which is referred to as diabetes-related distress (DRD) is common among such patients and may affect their response to treatment.
Objectives: To assess the relationship of diabetes-related distress and glycaemic control among patients with Type 2 Diabetes mellitus.
Methods: This hospital-based cross-sectional study was conducted at the Family Medicine Department of LASUTH, Ikeja, Lagos. A total of 317 patients with Type 2 Diabetes mellitus were systematically recruited. The data were collected over a four-month period. Important clinical information including clinical characteristics and diabetes-related distress using the diabetes distress scale (DDS-17) was collected. Glycosylated haemoglobin (HbA1c) was also assessed.
Results: The degrees of DRD were as follows: 54.9% (None/little), 40.1% (moderate) and 5.0% (severe). The mean HbA1c estimate for all participants was 7.83±1.8%. Among the 317 study participants, 67.2% had poor glycaemic control while 32.8% had good glycaemic control. There was a statistically significant association between DRD and glycaemic control ($p< 0.001$). Likewise, the various domains of DRD had statistically significant associations with glycaemic control with the exception of physician-related domain. Participants with better glycaemic control reported lower levels of DRD than participants with poorer glycaemic control.
Conclusion: There is a high level of diabetes-related distress patients with diabetes mellitus. Good glycaemic control is important in improving or preventing DRD. Therefore, T2DM patients should be screened for DRD during their treatment.

Key words: Diabetes Distress, Glycaemic Control, Non-Communicable Diseases, Type 2 Diabetes mellitus.

Introduction

The incidence of non-communicable diseases (NCD) such as obesity, hypertension, cancer and diabetes mellitus are increasing globally.[1] Diabetes mellitus (DM) is a common health problem in developed countries and a major risk factor for cardiovascular diseases.[2] The prevalence of DM is increasing in developing countries like Nigeria, where adoption of western

lifestyles and the stress of urbanization are associated with poor dietary habits.[2] Type 2 Diabetes mellitus (T2DM) accounts for about 90%-95% of all cases of DM globally.[2] Attaining glycaemic control among diabetes mellitus patients is a challenge globally. In Nigeria, studies have reported low prevalence of good glycaemic control in Nigeria. [2 – 4]

WHO defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.[5] Diabetes distress differs from depression - it implies aetiology rather than the presence or absence of specific symptoms; diabetes distress is content-related and distinguishes between different causes so that appropriate intervention can be implemented, and diabetes distress is not necessarily considered a co-morbid or psychopathology but a reaction to a demanding chronic disorder such as diabetes mellitus.[6] Diabetes-related distress (DRD) is defined as '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.[7]

The DDS-17 is a scale developed by Polonsky *et al.*, with four subscales: emotional-related distress, physician-related distress, regimen-related distress, and interpersonal-related distress. [9] Some of the reasons adduced for DRD include challenges with multi-drug pattern, additional routine injections, perceived lack of emotional care and experience from the physician, and HbA1c levels amongst others. [7, 9]

Studies have reported high levels of DRD in various parts of the world. [10 – 12] A study in Lagos reported that diabetes distress and low self-care practices were common and impacted each other, whilst advocating for interventions. [13] A multicentre study reported high DRD was more common among younger patients and patients with poorer glycaemic control.[14] A study in Saudi Arabia reported that among the components of DRD, emotional distress was the most prevalent followed by physician-related distress. A significantly higher HbA1c was seen in those with high emotional distress compared to those with moderate distress. [15]

There are few studies on DRD, especially at the level of primary care in Nigeria. This study aimed to assess the pattern of DRD and if there is any relationship with glycaemic control among patients living with diabetes mellitus in Lagos State, Nigeria.

Methods

Study location

This study was conducted at the Chronic Medical Disorder (CMD) Clinic of the Family Medicine Department (FMD) of Lagos State University Teaching Hospital (LASUTH) in Lagos State. It serves as a training, research and referral centre in the state. The Family Medicine Department comprises of clinics including the Chronic Medical Disorder (CMD) Clinic and the General Outpatient Clinic (GOPC). These clinics serve as the primary care clinic within a tertiary hospital setting and are manned by consultant family physicians, resident doctors and various cadres of medical officers. The Chronic Medical Disorder (CMD) Clinic serve to attend to uncomplicated cases of Type 2 Diabetes mellitus and hypertension from 8am to 4pm every week day. A daily average of 20 T2DM patients aged 18 years and above attends the CMD Clinic, LASUTH.

Study design

The study was a hospital based, descriptive, cross-sectional study.

Study population

The study participants were patients with T2DM aged 18years and above attending the chronic medical disorder clinic of LASUTH.

Inclusion criteria: Consenting adults with T2DM aged 18 years and above and who had been on treatment for ≥ 6 months prior to the commencement of the study.

Exclusion criteria: Patients with previously diagnosed mental health conditions prior to the diagnosis of T2DM, emergencies and pregnant women.

Sample Size Estimation

The minimum sample size was determined with the equation for calculating sample size in epidemiological studies as follows: [16]

$$n = \frac{z^2 Pq}{d^2}$$

Where n is the minimum sample size. Z denotes standard normal deviate at 95% confidence interval, which is 1.96. P denotes the proportion of outcome of interest from a previous study which is 25% (proportion of Type 2 diabetes mellitus patients with diabetes-related distress in a similar cross-sectional study conducted in 2018). [15] With a projected attrition rate of 10%, a total of 317 participants were recruited.

Sampling Technique

The systematic sampling method was used to recruit a total of 317 subjects over a period of four months This, gave an average of 4 participants that were recruited into the study every day. The sociodemographic and clinical characteristics of the participants were recorded. Diabetes distress was assessed using the DDS-17 questionnaire (Diabetes Distress Screening Scale-17). This is a 17–item questionnaire that used a 6–Likert scale response format to score each item based on the degree to which each of the 17 items might have distressed or bothered respondents during the past month. The scoring of each item ranged from 1 to 6 based on the degree of distress. A score of 1 was given to a ''Not a problem'' response, meaning not distressing at all. A score of 2 was awarded to ''A slight problem'' response, meaning a little bit distressing. A score of 3 was awarded to ''A moderate problem'' response, meaning moderately distressing. A score of 4 was awarded to a ''somewhat serious problem'' response meaning quite a bit distressing. A score of 5 was awarded to ''A serious problem'' response, meaning seriously distressing. A score of 6 was given to ''A very serious problem'' meaning extremely distressing.

The research tool has a good reliability alpha co-efficient of 0.95. It has four sub-scales namely: (a) Emotional Burden with 5 items (1,3,8,11,14), (b) Physician distress with 4 items (2,4,9,15), (c) Regimen distress with 5 items (5,6,10,12,16) and (d) Interpersonal distress with 3 items (7,13,17). The maximum score from the scale was 102 while the minimum score was 17. The total score was subsequently divided by 17 to give a mean score. A mean score of less than 2 points was termed little or no diabetes distress. Clinically significant distress was derived from a mean score between 2 points and less than 3 points and this was termed moderate distress. [16] A high diabetes distress was any mean score of ≥ 3 points. [17, 18]

The physical examination focused on parameters such as blood pressure, weight in kilograms, height in meters and body mass index (BMI). The mean average of three separate BP measurements was used as the BP. The glycosylated haemoglobin (HbA1c) level was measured in all the participants, using Clover A1c machine (manufactured by Infopia® in Korea) which has been validated by the International Federation of Clinical Chemistry.[19] It is currently the standardised instrument used in the chemical pathology department of LASUTH. A HbA1c < 7% was taken as good glycaemic control while HbA1c ≥7% was taken as poor glycaemic control.[20]

Data analysis

Descriptive statistics was used to describe the population, and Student's t-test and Pearson correlation test were used to analyse continuous data. A p value <0.05 was considered statistically significant. Correlation studies (Spearman or Pearson) were used to assess the linear relationship between diabetes-related distress score and glycosylated haemoglobin value among respondents.

Ethical considerations

Approval of the ethical review committee of the Lagos State University Teaching Hospital, Ikeja, Lagos was obtained with certificate number, LR/06/10/1144. Informed consent was obtained from eligible patients before administration of questionnaire. Privacy and confidentiality of respondents were guaranteed.

Results

Table I describes the socio-demographic characteristics of the 317 participants. The age of the participants ranged from 32 to 87 years, with the mean of 59.87±10.0 years. The modal age group was 50-59 years (112; 35.4%) and the least age group was < 50 years (47; 14.8%). More than three-quarter of the participants were married (245; 77.3%) while more than four-fifth had more than primary education.

Table II shows diabetes-related characteristics among participants. About one-third (130; 41.0%) had been diagnosed with diabetes for one to five years while less than one-fifth (40; 12.6%) had been diagnosed for less than one year. About a quarter (235; 74.1%) were on oral anti-diabetes drugs while about one-quarter used insulin (82; 25.9%). More than half (185; 58.4%) of the participants spent between ten to twenty thousand naira monthly on anti-diabetes medications while less than one-fifth (58; 18.3%) spent greater than twenty thousand naira. A majority were either overweight (137; 43.2%) or obese (119; 37.5%).

Figure 1 depicts shows that more than half (174; 54.9%) had little/no diabetes distress. Similarly, Figure 2 shows that the severe diabetes distress was recorded in all categories except for physician-related distress. Among the subscales, emotional-related distress got the highest scores for moderate to severe distress followed by regimen-related distress while physician-related distress was the least.

The mean HbA1c estimate for all the participants was 7.83±1.8%. About two-thirds (213; 67.2%) had poor glycaemic control while about one-third (104; 32.8%) had good glycaemic control. Table III shows that the participants with poor glycaemic control had significantly greater mean scores of diabetes distress than those with good glycaemic control in all the sub-domains except for physician-related distress. Table IV shows a statistically significant but weak positive correlation between HbA1c and emotional-related distress (r -0.457, p <0.001), regimen-related distress (r -0.270, p <0.001) and interpersonal-related distress (r -0.233, p <0.001).

Discussion

More than two-thirds of the participants in this study had poor glycaemic control. Various studies in Nigeria have also reported high prevalence of poor glycaemic control ranging from 45.3% to 73.7%. [2 - 4, 21,22]

This may be due to similarities in socio-demographic, lifestyle and clinical characteristics in Nigerians living with T2DM, regardless of their location either in the Southern or Northern part of the country. Studies in African countries [23 - 25] and developed countries [26 - 28] have also reported high levels of poor glycaemic control.

Table I: Sociodemographic characteristics of participants

Variable	*Frequency*	*Percentage*
Age group (Years)		
<50	47	14.8
50-59	112	35.4
60-69	104	32.8
≥70	54	17.0
Mean ± 0SD	59.87±10.0	
Gender		
Male	76	24.0
Female	241	76.0
Ethnic group		
Yoruba	196	61.9
Igbo	106	33.4
Hausa	7	2.2
Others	8	2.5
Marital status		
Single	5	1.6
Married	245	77.3
Divorced	9	2.8
Separated	4	1.3
Widowed	54	17.0
Religion		
Islam	86	27.1
Christianity	231	72.9
Educational level		
None	14	4.4
Primary	99	31.2
Secondary	116	36.6
Tertiary	88	27.8
Employment status		
Employed	174	54.9
Unemployed	85	26.8
Retired	58	18.3
Average monthly income (Naira)		
<25,000	77	24.3
25,000-49,999	104	32.8
50,000-74,999	101	31.9
≥75,000	35	11.0
Alcohol consumption status		
Never drank	147	46.4
Ever drank	170	53.6
Smoking status		
Never smoked	283	89.3
Ever smoked	34	10.7

Table II: Clinical characteristics of participants

Variable	*Frequency*	*Percentage*
Duration of disease		
< 1 year	40	12.6
1-5 years	130	41.1
6-10 years	87	27.4
>10 years	60	18.9
3.54 ±1.3 years		
Monthly estimate spent on anti-diabetes medications (Naira)		
≤10,000	74	23.3
10,000-20,000	185	58.4
>20,000	58	18.3
Type of anti-diabetes treatment		
Oral agents only	235	74.1
Oral agents and insulin	82	25.9
Number of anti-diabetic drugs		
One	14	4.5
Two	149	47.0
Three	145	45.7
Four	9	2.8
BMI class		
Normal	61	19.2
Overweight	137	43.2
Obese	119	37.6
Mean±SD(kg/m2)	28.73±4.4	
Co-morbid conditions		
Yes	296	93.4
No	21	6.6
On medication for other medical conditions	306	96.5
Yes	11	3.5
No		

The importance of good glycaemic control in prevention of microvascular complications was well established in Diabetes Control and Complications Trial and United Kingdom Prospective Diabetes study. [20] Diabetes distress is common and has significant impact on the health outcome of adult T2DM patients as reported in this study and several other studies. [10 - 12] The prevalence of diabetes distress in this study, of about 45%, which is clinically significant is same as other studies, [10 - 12, 29 – 31] though a study in Sudan[10] and China[32] reported higher prevalence of 87% and 90% respectively. Therefore, in clinical practice, health care practitioners need to pay closer attention to diabetes-related distress. This study found that total diabetes-related distress, emotional-related distress (ERD), regimen-related distress (RRD), interpersonal-related distress (IPD) had weakly positive but significant correlations with HbA1c. This indicates that efforts should be aimed at counselling patients on the psychosocial impact of diabetes mellitus in addition to simplifying drug regimens when drugs and other therapy are

prescribed. Similarly, patients with poor glycaemic control were observed to have significantly higher mean diabetic distress scores in all domains except for physician-related distress (PRD). Islam *et al.*,[30] Tunsuchart,[33] Hameed *et al.*, [34] all reported a strongly positive correlations between diabetes distress scores and HbA1c using DD17 in the assessment of DRD.

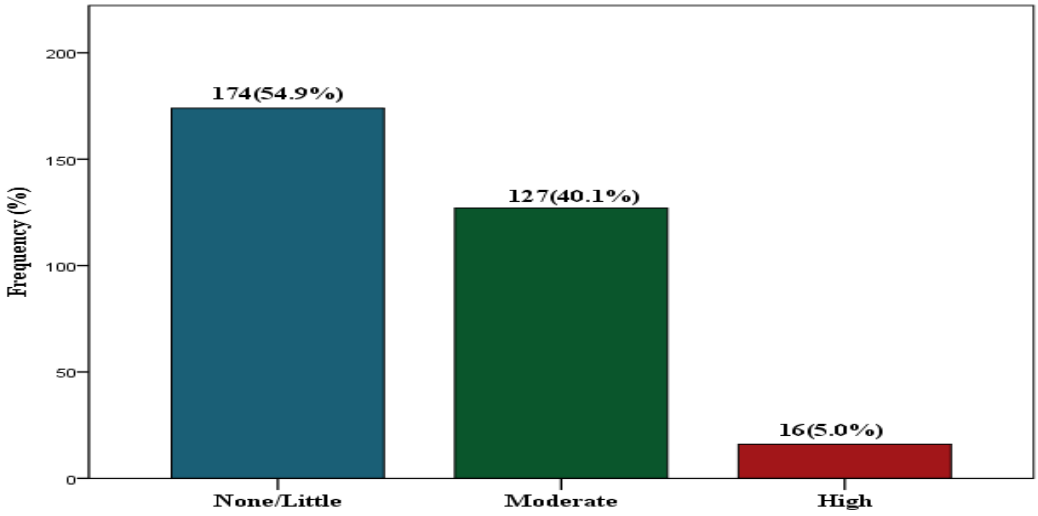
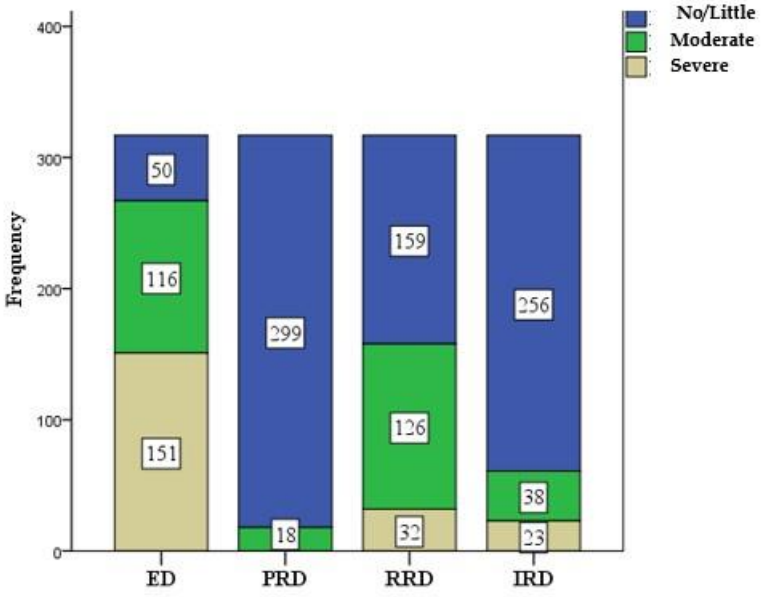


Figure 1: Levels of Diabetes-Related Distress



ED - Emotional Distress, PRD - Physician-Related Distress, RRD - Regimen-Related Distress, IRD - Interpersonal-Related Distress

Figure 2: Domains of Diabetes- Related Distress

Table III: Total and sub-domain scores of diabetes-related distress according to glycaemic control status

	Good Control Mean±SD	*Poor Control Mean±SD*	*t-value*	*p-value*
Emotional distress	2.25±0.8	3.24±0.9	-9.093	<0.001
Physician-related distress	1.24±0.4	1.21±0.3	0.664	0.507
Regimen distress	1.73±0.5	2.12±0.7	-5.023	<0.001
Interpersonal distress	1.25±0.4	1.51±0.8	-2.726	0.007
Overall distress	1.68±0.4	2.13±0.5	-8.151	<0.001

Table IV: Correlation between Diabetes-Related Distress Domains and HbA1c

	Correlation confident (r)	*p-value*
Emotional distress	0.457	<0.001
Physician-related distress	0.011	0.841
Regimen related	0.270	<0.001
Interpersonal related	0.233	<0.001

Emotional distress was the most predominant domain in the studied patients with diabetes distress. This finding is in keeping with other studies, [7,10,12,29,31,35] which have reported emotional distress as a significant parameter of DRD. This emphasizes the need for psycho-social support and diabetes education in the management of diabetes mellitus. A study in Lagos, Nigeria, however found that emotional-related distress (ERD) was not associated with glycaemic control, but concluded that DM patients without diabetes distress were two times likely to have good glycaemic control. [36] Skinner *et al.* in United Kingdom, also reviewed articles published in the past twenty-five years on diabetes-related distress and reported that DRD may adversely affect glycaemic control through lack of self-care behaviours and high diabetes distress level. [37] These findings underscore the importance of guidelines recommending that primary care physicians should screen for diabetes-related distress in the course of managing cases of Type 2 diabetes mellitus.[37] Rawel *et al.* in Canada conducted a cross-sectional study among 41 South Asian adults with T2DM and found no significant association between diabetes distress and glycaemic control. [38] The finding was likely due to the effect of a small study population and measures in the Canadian health system like health insurance. These findings should prompt a clinical attention towards screening for DRD and addressing patients' glycaemic control.

Limitations

This was a hospital-based study which could limit the generalization of the findings to the larger population of patients living with diabetes mellitus. Sociodemographic factors could also be confounders to the findings.

Conclusions

In this study, a majority of the participants did not have good glycaemic control. There was also a high level of DRD with significant association of the components with poor glycaemic control except physician related distress. Physicians treating T2DM patients should also be aware and screen for DRD during clinical encounters.

Authors' Contributions: OA conceived and designed the study and did the literature review. OA, SOO and MS performed data analysis and interpretation. SOO, MS and DAO drafted the manuscript and revised the draft for sound intellectual content. SOO and MS approved the final version of the manuscript.
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