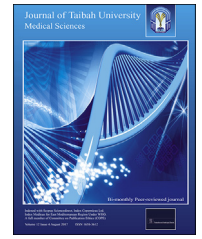Taibah University

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Original Article

Distress and psychopathology among Sudanese patients with type 2 diabetes mellitus and its relation to glycaemic control

Hyder O. Mirghani, MD

Medical Department, Faculty of Medicine, University of Tabuk, Tabuk, KSA

الملخص

أهداف البحث: العلاقة بين التحكم بداء السكري والاكتئاب علاقة متناقضة ومتعارضة. الاضطراب العاطفي هو سمة واحدة ومستمرة ذات خاصيتين أساسيتين؛ المحتوى والشدة، وهذا يمكن أن يوفر حلقة وصل بين الاكتئاب الشديد، وضائقة السكري، وأعراض الاكتئاب. في هذه الدراسة، نهدف للبحث في العلاقة بين الاكتئاب وضائقة السكري للسيطرة على نسبة السكر في الدم.

طرق البحث: أجريت هذه الدراسة الوصفية المقطعية في مركز السكري في أم درمان، السودان خلال الفترة من يونيو إلى أغسطس ٢٠١٦. تمت مقابلة ٨٩ مريضا يعانون من داء السكري النوع ٢ و٢٩ عينة ضابطة للأمراض النفسية باستخدام النسخة الإنجليزية المحتوية على ١٢ بندا لاستبانة الصحة العامة وضائقة السكري. كما أُخذت عينة دم للهيموجلوبين السكري من جميع المشاركين لتقييم السيطرة على نسبة السكر في الدم.

النتائج: أجريت هذه الدراسة على ٨٩ مريضا بالسكري و٢٩ عينة ضابطة، متطابقة للعمر والجنس. سجل أكثر عدد ممكن ٨٧.٦٪ من مرضى السكري أكثر من ثلاث ضوائق للسكري، كما سُجلت الأمراض النفسية في ٧٨.٨٪ من مرضى السكري مقارنة بـ ٢١.٢٪ في المجموعة الضابطة. كان العبء العاطفي الأعلى بين مكونات ضائقة السكري متبوعا بالأمور المتعلقة بالطبيب. كما وجدت علاقة بين الهيموجلوبين السكري والعبء العاطفي والأمور المتعلقة بالحمية لضائقة السكري. لم توجد علاقة بين أمور الضيق الأخرى والأمراض النفسية ومدة الإصابة بمرض السكري.

الاستنتاجات: تنتشر ضائقة السكري والاكتئاب بين مرضى السكري السودانيين. ويرتبط الهيموجلوبين السكري بالعبء العاطفي من ضائقة السكري والأمور المتعلقة بالحمية وليس الاكتئاب أو مدة الإصابة بداء السكري.

الكلمات المفتاحية: ضائقة السكرى؛ السكري والاكتئاب؛ الهيموجلوبين السكري؛ الأمراض النفسية؛ العبء العاطفي

Corresponding address: Faculty of Medicine, University of Tabuk, P.O. Box 3378, Tabuk 51941, KSA.

E-mail: s.hyder63@hotmail.com

Abstract

Objectives: The link between diabetes control and depression is contradictory and inconsistent. Emotional distress is a single and continuous characteristic that has two primary components: content and severity. This finding could provide a link between major depression, diabetes distress, and depression symptoms. In the present study, we aimed to investigate the relationship between depression and diabetes distress and glycaemic control.

Methods: This cross-sectional descriptive study was conducted at a diabetes centre in Omdurman, Sudan, from June to August 2016. Eighty-nine patients with type 2 diabetes and 29 control subjects for psychopathology were interviewed using an English version of the structured 12-item diabetes distress general health questionnaire. Glycaemic control was assessed by measuring glycated haemoglobin in a blood sample drawn from each participant.

Results: Eighty-nine diabetic patients and 29 age- and sex-matched controls compose the study cohort. As many as 87.6% of diabetic patients scored >3 for diabetes distress, and psychopathology was reported in 78.8% of diabetic patients vs. 21.2% in control subjects. Emotional burden was most correlated among the components of diabetes distress followed by the physician-related domain. HbA1c level was related to the emotional burden and regimen-related domains of diabetes distress (P-value <0.05). No relationship was evident among other distress domains, psychopathology, or the duration of diabetes.

Conclusion: Diabetes distress and depression are prevalent among Sudanese diabetic patients. Glycated

haemoglobin level was related to the emotional burden of diabetes distress and the regimen-related domain but not to depression or diabetes duration.

Introduction

Diabetes mellitus is a global health burden; the number of people affected by the disease is expected to rise from the current 285 million to 438 million by the year 2030.[1]

Diabetes mellitus is a lifelong condition that represents a major health problem; it imposes an enormous emotional and financial burden on the patient and the whole community.[2] Due to the adoption of diets with high saturated fat and refined sugar, coupled with a lack of physical activity, diabetes mellitus is emerging as a significant health problem in Sudan. According to the World Health Organization report, half a million people were affected by diabetes in Sudan in the year 2000, and the number is projected to reach one million by the year 2030.[3]

The American Diabetes Association recommendations call for a target for glycated haemoglobin of <7 in both type 1 and type 2 diabetes mellitus to reduce microvascular complications such as retinopathy, nephropathy, and neuropathy.[4]

There is an increasing awareness of the psychological effects of diabetes self-management and diabetes control and the emotional burden of carrying a diagnosis of diabetes mellitus. Being diagnosed with diabetes is a stressful life condition that requires both physical and mental coping strategies. Depression is common among Sudanese patients with diabetes mellitus, and when present together, these conditions exacerbate one another and can lead to deleterious consequences or even fatal complications.[5]

Psychological stressors, by activating the hypothalamic—pituitary—adrenal axis, can stimulate the sympathetic nervous system, release inflammatory markers, and increase platelet aggregation. This leads to insulin resistance, thereby contributing to poor glycaemic control and increasing the risk of vascular complications.[6]

Diabetes distress captures the fear, worries, and concerns among patients suffering from a chronic, progressive and demanding disease such as diabetes mellitus. Major depressive disorder requires the presence of five out of nine well-defined symptoms that lead to significant functional impairment and emotional distress. The symptoms must be present for at least two weeks.[7,8]

Diabetes distress differ from depression in the following: It implies aetiology rather than focussing on 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, rather, is a reaction to a demanding chronic disorder such as diabetes.[7]

Few researchers have studied the relationship between depression, diabetes distress, and glycaemic control in Sudan. Sudan is a vast country with ethnic and cultural diversity, so the effect of diabetes distress and psychopathology on diabetes mellitus observed in Western countries may not apply. Therefore, we conducted this research to assess the effects of depression and diabetes distress on glycaemic control in Sudan.

Materials and Methods

This is a cross-sectional descriptive study involving 89 patients with a diagnosis of type 2 diabetes mellitus according to the American Diabetes Association guidelines[4] who were seen for routine follow-up and 29 age- and sex-matched control subjects (used as controls for psychopathology). The study was conducted at a diabetes centre in Omdurman, Sudan, during the period of June 2016 to September 2016. The sample size was calculated using the formula $n = Z^2 P{-}Q/d^2$ where Z = 95% confidence (1.96), P = Prevalence of diabetes mellitus in Sudan,[9] Q = 100-prevalence, and d = tolerated error. The sample size was calculated to be 76 and increased to 89 to minimize error. The control subjects were randomly chosen from relatives and co-patients to address confounding factors such as socio-economic factors and education level[10]

The participants were asked to sign a written informed consent and were then interviewed in a ratio of 1:2 using a structured questionnaire based on the English versions of the diabetes stress scale and the general health questionnaire-12. The questionnaires were translated into Arabic by experienced translators and the principal researcher. Co-patients explained any difficulties that arose during the interview to ensure that every question was clear to the participants. Patients aged above 35 years with type 2 diabetes were approached in a ratio of 1:1 and those with severe diabetes complications, psychosis, or dementia were excluded. The diabetes distress scale is a well-validated 17-item questionnaire[11] that measures different stressors. Each question has six answer choices: 1 = no problem, 2 = slight problem, 3 = moderate problem, 4 = somewhat serious problem, 5 = a serious problem and 6 = a very serious problem. The questionnaire is further divided into four subscales as follows:

- Questions 1, 3, 8, 11, and 14 (emotional burden)
- Questions 2, 4, 9, and 15 (physician-related)
- Questions 5, 6, 10, 12, and 16 (regimen related)
- And questions 7, 13, and 17 (interpersonal relationship)

The cut-off value for the diagnosis of diabetes distress was a sum of ≥three on the scale.[12]

The 12-item general health questionnaire was used for the diagnosis of psychopathology. It is well validated[13] for the measurement of depression in diabetic patients and is widely used as a proxy for affective disorders in public health surveys. It also has excellent discriminant validity.[14] The questionnaire asks about being able to concentrate on

what you are doing, losing sleep over worries, feeling that you are playing a useful part of things, feeling able to make decisions about things, feeling constantly under strain, feeling you cannot overcome your difficulties, being able to enjoy normal day to day activities, being able to face up problems, feeling unhappy or depressed, losing confidence in yourself, feeling worthless, and feeling reasonably happy when all things are considered. Each question ranged from 0 to 3 with 0 = less than usual, 1 = no more than usual, 2 = rather more than usual, and 3 = much more than usual, for a total possible score of 36. The GHQ marking scale (0:0:1:1) was used in this research to eliminate bias. A total cut off of 5−6 was scored as negative for psychopathology, and a score of 7 or more was positive for psychopathology. Questions 2, 5, 6, 9, 10, and 11 of the scale are marked in a negative way.

Demographic information, duration of diabetes, and diabetes medications were additional data collected.

A blood sample was taken for HbA1c measurement to assess the degree of glycaemic control using a glycol haemoglobin reagent set manufactured by HB1C Siemens Healthcare Diagnostics Newark, DE 19714, USA. The ethical committee of Omdurman Teaching Hospital approved the research and The Statistical Package for Social Sciences (SPSS version 16) was used for data analysis. The data variables were tested for normality of distribution and found to be normally distributed; therefore, t-test and Pearson correlation analysis were used to test the relationship between the variables. The data were presented as the mean ± SD or percentages, unless otherwise specified, with a P-value< 0.05 considered significant.

Results

Of the 89 diabetic patients enrolled in the study, 40.2% were males, their ages ranged from 38 to 82 years with a mean of 59.64 ± 9.60 years, and the duration of diabetes mellitus was 9.14 ± 8.1 years (Table 1).

In the present study, nearly two-thirds of the participants were on sulphonylureas (59.1%). Additionally, 72.4% were taking metformin, while 8.9% were taking insulin. Table 2 illustrates the drug therapy of the enrolled diabetic patients.

Table 3 depicts the components of the diabetes distress scale in which the highest value was reported for feeling that I will end up with serious long-term complications no matter what I do (4.60 ± 1.40), followed by feeling overwhelmed by the demands of living with diabetes (4.33 ± 1.62) and feeling that I don't have a doctor who I can see regularly

Table 1: Characteristics of the study group.

Character	Mean ± SD
Age	
Mean ± SD	59.64 ± 9.60
Duration of diabetes	9.14 ± 8.1
Sex	
Males	36 (40.4%)
Females	53 (59.6%)
Psychopathology	78.8%
Diabetes distress score > 3	87.6%

Table 2: Medications taken by the study groups.

Drug	n (%)
Sulphonylureas	
Glibenclamide	10 (11.4%)
Glimepride	38 (43.2%)
Gliclazide	4 (4.5%)
Total	52 (59.1%)
Metformin	64 (72.4%)
Pionorm	7 (8%)
Insulin	8 (8.9%)
Statins	48 (54.1%)
Aspirin	43 (47.7%)
Amlodipine	19 (21.8%)
Losartan	23 (26.1%)
Bisoprolol	4 (4.5%)

about my diabetes (3.87 ± 1.76). The lowest reported values were for feeling that friends or family don't give me the emotional support that I would like and feeling that friends or family don't appreciate how difficult living with diabetes can be (3.35 ± 2.19 and 3.39 ± 1.85, respectively) (see Table 4).

Regarding the general health questionnaire components, no statistically significant difference was evident among patients with type 2 diabetes and control subjects in the ability to concentrate on what they are doing (2.02 ± 0.80 vs. 1.96 ± 0.49, P-value = 0.695). Diabetic patients were more likely to lose much sleep over worries, and this difference was statistically significant (1.43 ± 0.71 vs. 0.93 ± 0.45, P-value = 0.001). No differences were evident between patients and control subjects regarding the feeling that they are playing a useful part of things and the feeling of the ability to make decision about things (1.89 ± 0.48 vs. 1.82 ± 0.38 and 1.95 ± 0.62 vs. 1.82 ± 0.38, P-values = 0.489 and 0.308, respectively). Diabetic patients were more likely to feel constantly under strain, and this difference was statistically significant (1.55 ± 0.75 vs. 1.06 ± 0.65 P-value = 0.004). Table 5 illustrates the other components of the general health questionnaire among patients with type 2 diabetes and control subjects.

In the present study, no correlation was found between the glycated haemoglobin and age (Pearson correlation = 0.076, P-value = 0.481) or the duration of diabetes (Pearson correlation = 0.112, P-value = 301). A significant positive correlation was observed between the emotional and regimen-related domains of the diabetes distress scale and HbA1c level (Pearson correlation = 0.221 and 0.331, P-values = 0.039 and 0.002, respectively). A negative correlation was observed between the interpersonal and physician related domains and glycated haemoglobin level with no significant statistical difference (Pearson correlation = −0.129 and −0.009, P-value = 0.232 and 0.934, respectively). The current data show no correlation between the total diabetes-related distress or psychopathology scores and glycaemic control (Pearson correlation = 0.176 and −0.034, P-value = 0.101 and 0.782, respectively) (Table 5).

In the current study, statistically significant differences were found between males and females regarding the duration of diabetes (11.58 ± 9.9 vs. 7.46 ± 6.10, P-value = 0.018), but no significant differences were reported

Table 3: The different components of the diabetes distress scale.

Character	Mean ± SD
Feeling that diabetes is taking too much of my physical and mental energy	3.88 ± 1.38
Feeling that my doctor doesn't know enough about diabetes and diabetes care	3.71 ± 1.38
Feeling angry, scared and/or depressed when I think about living with diabetes	3.80 ± 1.40
Feeling that my doctor doesn't give me clear enough directions on how to manage my diabetes	3.64 ± 1.44
Feeling that I am not testing my blood sugar frequently enough	3.43 ± 1.30
Feeling that I am often failing with my diabetes regimen	3.51 ± 1.28
Feeling that friends or family not supportive enough	3.47 ± 1.63
Feeling that diabetes controls my life	3.92 ± 1.45
Feeling that my doctor doesn't take my concerns seriously enough	3.82 ± 1.40
Not feeling confident in my day-to-day ability to manage diabetes	3.58 ± 1.45
Feeling that I will end up with serious long-term complications, no matter what I do	4.60 ± 1.40
Feeling that I am not sticking closely enough to good meal plan	3.41 ± 1.40
Feeling that friends or family don't appreciate how difficult living with diabetes can be	3.39 ± 1.85
Feeling overwhelmed by the demands of living with diabetes	4.33 ± 1.62
Feeling that I don't have a doctor who I can regularly see about my diabetes	3.87 ± 1.76
Not feeling motivated to keep up my diabetes self-management	3.44 ± 1.93
Feeling that friends or family don't give me the emotional support that I would like	3.35 ± 2.19

Table 4: The general health questionnaire components among diabetic patients and control subjects.

Parameter (Mean ± SD)	Diabetics	Control	P-value*
Being able to concentrate on what you are doing	2.02 ± 0.80	1.96 ± 0.49	0.695
Losing much sleep over worries	1.43 ± 0.71	0.93 ± 0.45	0.001
Feeling that you are playing useful part of things	1.89 ± 0.48	1.82 ± 0.38	0.489
Feeling able about making decisions about things	1.95 ± 0.62	1.82 ± 0.38	0.308
Feeling constantly under strain	1.55 ± 0.75	1.06 ± 0.65	0.004
Feeling you couldn't overcome your difficulties	1.01 ± 0.62	0.75 ± 0.43	0.049
Feeling able to enjoy your normal day to day activities	2.18 ± 0.69	1.82 ± 0.53	0.014
Feeling able to face up your problems	2.05 ± 0.72	1.89 ± 0.48	0.275
Feeling unhappy or depressed	1.44 ± 0.79	0.93 ± 0.59	0.002
Losing confidence in yourself	0.92 ± 0.55	0.72 ± 0.45	0.083
Feeling of yourself as a worthless person	0.86 ± 0.53	0.82 ± 0.53	0.726
Feeling reasonably happy all thing considered	2.21 ± 0.74	1.75 ± 0.51	0.003
Overall psychopathology score	19.53 ± 5.02	16.27 ± 3.53	0.002

* t-test.

In the present study, psychopathology was evident in 78.8% of diabetic patients vs. 21.2% of healthy controls. This result is lower than that reported in Malaysia (41.7%) and the United States of America (17%).[10,16] Racial factors and the different measures used to establish a diagnosis may explain the differences in the prevalence of diabetes distress and depression.[7,17]

The current data show no relationship between age, gender, the duration of diabetes mellitus, diabetes-related distress score, or psychopathology and the level of glycaemic control (HbA1c). Similarly, researchers from Malaysia[18] reported no correlation between age, sex, ethnicity, diabetes-related distress or psychopathology and glycaemic control. Our data differed from the data generated by studies conducted in India.[19]

regarding age (58.97 ± 9.9 vs. 60.11 ± 9.4, P-value = 0.586) or HbA1c (9.86 ± 2.34 vs. 9.94 ± 2.87, P-value = 0.899). Table 6 depicts the comparison between males and females.

Discussion

In the present study, diabetes distress was identified in 87.6% of patients with type 2 diabetes, which was higher than the results of a survey carried out in Malaysia[8] in which diabetes distress was observed in 49.2% of patients. In mainland China,[15] the prevalence of diabetes-related distress was 64%, which is lower than that in the present study. In the current survey, the highest score was reported for the fear of the diabetes complications and the demands of living with diabetes mellitus. It would be very difficult to compare the rate of diabetes distress reported in the current study and those reported in other countries because of the wide variations in age, gender, racial factors, measures used for diagnosis, and the scale of diabetes centres. There is some possibility of selection bias.

Table 5: The correlation between HbA1c and age, duration of diabetes, diabetes distress domains and psychopathology.

Character	Pearson correlation	P-value*
Age	0.076	0.481
Duration of diabetes	0.112	0.301
Emotional domain	0.221	0.039
Physician domain	−0.009	0.934
Regimen domain	0.331	0.002
Interpersonal domain	−0.129	0.232
Total distress score	0.176	0.101
Psychopathology total score	0.034	0.782

* Pearson Correlation.

Table 6: A comparison between males and females regarding age, duration of diabetes, diabetes distress domains and psychopathology and HbA1c.

Character	Male	Female	P-value*
Age	58.97 ± 9.9	60.11 ± 9.4	0.586
Duration of diabetes	11.58 ± 9.9	7.46 ± 6.10	0.018
HbA1c	9.86 ± 2.34	9.94 ± 2.87	0.899
Emotional domain	4.11 ± 0.74	4.11 ± 0.89	0.994
Physician domain	3.66 ± 1.08	3.85 ± 1.15	0.454
Regimen domain	3.52 ± 1.43	3.17 ± 1.43	0.266
Interpersonal domain	3.48 ± 0.83	3.41 ± 1.01	0.727
Total distress score	3.67 ± 0.58	3.66 ± 0.70	0.992
Psychopathology total score	19.44 ± 4.51	20.07 ± 4.45	0.573

* t-test.

The previous literature[20] reported that there was no relationship between depression and glycaemic control and suggested that any relationship to the depressive state had to be of sufficient duration and intensity to demonstrate an effect. Additionally, depression may affect glycaemic control by different pathways in different patients. In the present study, no relationship was evident between depression, as measured by the 12-items general health questionnaire, and glycated haemoglobin level, which supports the above observation.

In the present study, emotional burden was the most important domain in measuring diabetes distress (4.08 ± 0.88), followed by physician-related factors (3.75 ± 0.1.13). Both were in the range of a somewhat serious problem, and previous researchers have reported similar findings.[21] Furthermore, the emotional burden and regimen-related domains were related to glycated haemoglobin, in line with previous literature[22,23] that found that the emotional burden and regimen-related domains were a strong predictor of glycaemic control.

Previous studies concluded the following: the items of the emotional burden domain and the regimen related distress domain loaded on the same factor and correlated to HbA1c.[12]

Interestingly, the current data show that the emotional domain had the highest value, followed by the physician-related domain. The interpersonal domain (representing the family and friends support) had the lowest value. Furthermore, the emotional- and regimen-related domains were associated with poor glycaemic control. The supportive extended Sudanese family can be over caring (as shown by the low interpersonal score), regularly supervising patients and asking them to take care of their diabetes, which places more pressure on them (high regimen score). This may increase the emotional domain, creating a vicious cycle marked by less glycaemic control and more microvascular complications.[24,25] Family education is of paramount importance to reduce diabetes distress, as resilience and self-efficacy have been found to decrease diabetes distress, while empowerment substantially increases it.[26] Behavioural intervention has shown promise in helping diabetic patients manage the emotional burden. A better understanding of how diabetes relates to distress and how earlier detection

and appropriately timed support helps patients cope with diabetes[23] is greatly needed.

The present study shows that diabetic patients feel that they will end up with serious long-term complications no matter what they do. Feeling that they do not have a doctor who they can see regularly about their diabetes and feeling overwhelmed by the demands of living with diabetes are the most important components pointing to the fact that patients are not well educated about diabetes complications. Their knowledge about strict glycaemic control and the microvascular complications of diabetes may also be weak. Furthermore, doctors are not available for patient follow-up, and laboratory tests and medications may be costly for the patients. The majority of Sudanese subsist under the absolute poverty line, with a low priority for expenditures on high health needs. The lack of organized diabetes care, shortage of well-trained staff in diabetes management and unavailability of social workers may add to the serious problem of diabetes distress and increase patient suffering.

In the present study, no statistically significant differences were found between women and men regarding age, HbA1, diabetes-related distress components, and psychopathology, while males tend to have diabetes for a longer period than females. A plausible explanation could be the small size of the study sample.

Conclusion

Diabetes distress and psychopathology were both common among Sudanese patients with type 2 diabetes. The emotional burden and regimen-related domains of diabetes distress, but not psychopathology, were related to glycaemic control.

Recommendations

Larger multicentre studies are needed to examine the effects of the different components of diabetes distress on the glycated haemoglobin, diabetes self-management, and medication adherence.

The study is limited by the small size of the survey sample and the fact that it was conducted at a single diabetes centre. For these reasons, generalization cannot be ensured. Additionally, we did not report significant factors such as the level of education or marital status, which may substantially affect diabetes distress. The unmatched number of control subjects and diabetic patients may also have affected the result.

Author's contribution

HOM conceived and designed the manuscript; performed data collection, analysis and interpretation; drafted the manuscript and critically revised and approved it before submission; and is responsible for the content and similarity index of the manuscript.

Conflict of interest

The author has no conflict of interest to declare.

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