

Distress and Its Effect on Adherence to Antidiabetic Medications Among Type 2 Diabetes Patients in Coastal South India

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Abstract

Background: Distress can bring about an unfavorable attitude among the patients toward tackling their disease which can affect adherence to medications. The purpose of this study was to assess the effect of distress on adherence to medication among patients with diabetes. **Methodology:** In this cross-sectional study, 124 type 2 diabetes patients above 18 years, attending the hospitals affiliated to Kasturba Medical College, Mangalore, selected using nonprobability sampling were interviewed to assess the presence of diabetes-related distress (DRD) and their level of adherence to medications. Distress was assessed using diabetes distress scale. Morisky Adherence Questionnaire was used to assess the level of adherence. Approval was obtained from the Institutional Ethics Committee. Multivariate logistic regression was conducted to assess the influence of domains of distress on adherence to antidiabetic medication and $P < 0.05$ was considered statistically significant. **Results:** In our study, 41.9% ($n = 52$) of the participants had high diabetes distress. Exactly 43.5% ($n = 54$) of the participants had low adherence to antidiabetic medications. On univariate analysis, participants with low regimen distress, low physician distress, and low interpersonal distress were found to have good adherence to antidiabetic medication. However, on multivariate analysis, only low regimen distress was found to be significantly associated with good adherence to medication among the study participants. **Conclusion:** DRD is a problem in our study participants which affects the adherence to medications. Identifying distress at an early stage can help doctors formulate and implement remedial measures, thereby improving adherence to medications.

Keywords: Adherence, diabetes distress, diabetes distress scale, South India, type 2 diabetes

INTRODUCTION

According to the World Health Organization (WHO), diabetes is a state of chronic hyperglycemia resulting from decrease in insulin production (type 1) or decreased insulin uptake by cells (type 2) leading to multitude of complications ranging from disease of the small vessels of kidney and retina, peripheral neuropathy, and coronary artery disease.^[1]

The global age-standardized prevalence of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% among the adult population.^[2] Up to 91% of adults in high-income countries have type 2 diabetes, whereas in South and Central America Region, the number of people with diabetes is expected to rise by 65% by 2040.^[3] India, once the diabetes capital of the world, is the largest contributor to mortality in South–East Asian Region. India has around 69 million people with diabetes, with a prevalence of 8.7%, which is estimated to increase

to 87 million by the year 2030.^[4] Not only numbers, but the economic impact of diabetes is also high with 12% of global health expenditure being spent on diabetes.^[3]

The chronicity of the condition poses a significant burden on the patient, both physically as well as psychologically.^[5] Once diagnosed with diabetes, the patient needs to bring about a drastic change in his/her lifestyle to achieve favorable metabolic control and to avoid complications. The process is complex which involves a multitude of self-care activities ranging from strict adherence to medication, diet, physical

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activity, and frequent blood glucose monitoring. On a longer run, the disease can create an emotional burden among the patients which might affect the activities related to diabetes self-care. Diabetes-related distress (DRD) and depression are the two extremes of psychological effect seen among patients with diabetes.^[6]

DRD is defined as “patient concerns about disease management, support, emotional burden, and access to care.” It is quite distinct from depression which is not diabetes specific but can be long-term sequelae to diabetic distress.^[6] DRD can be measured across 4 domains which include physician-related distress, emotional burden, interpersonal distress, and regimen distress.^[7] DRD can bring about unfavorable attitudes among the patients toward tackling the disease such as poor compliance to medication, poor diet control, disinterest in exercises, irregular follow-up visits, and poor self-care. There is higher incidence of complications associated with diabetes among patients having DRD.^[8] Nonadherence to antidiabetic medications bring about poor blood glucose control and, hence, results in higher mortality among population with diabetes.^[6]

Many studies have been done in the past to find out level of adherence and distress among people living with diabetes; however, there are very limited studies trying to explore the association between distress and adherence to antidiabetic medication, especially from the study region. With this background, the present study was conducted to study the effect of DRD on adherence to medication among patients with diabetes in Coastal South India.

METHODOLOGY

Approval was obtained from the Institutional Ethics Committee of Kasturba Medical College, (Manipal University, Mangalore), India, before the commencement of the study. In this cross-sectional study, 124 patients with type 2 diabetes attending the outpatient department of the teaching hospitals affiliated to Kasturba Medical College (Manipal University), Mangalore, were selected using nonprobability sampling and interviewed, between January and March 2015, to assess the presence of DRD and level of adherence to diabetes medications. All the participants were above 18 years of age and were on antidiabetic treatment for more than 6 months. The interview schedule consisted of three sections: Section A - Sociodemographic information, Section B - Diabetes distress scale, and Section C - Morisky 8-item Medication Adherence Questionnaire.

The diabetic distress scale^[6] consisting of 17 questions was used to measure distress among diabetes patients across four domains: Physician-related distress, emotional burden, interpersonal distress, and regimen distress. The responses of the patients were recorded using a 6-point scale with the following grading: 1 or 2 - not a problem, 3 or 4 - moderate problem, and 5 or 6 - serious problem. The patients' responses to the appropriate items were added and then divided by the number of items in that particular scale. Participants with a

total score of <2.0 were considered to have little or no distress, those with a score between 2.0 and 2.9 were considered to have moderate distress, and ≥ 3.0 were considered to have high distress.

Morisky Adherence Questionnaire^[9,10] was used to assess the level of adherence to the antidiabetic medication. The questionnaire consisted of 8 questions with a yes or no answer. 1 point was awarded for every yes response and a zero for every no response. A total score of >2 meant low adherence, 1 or 2 as having medium adherence, and a 0-high adherence.

After obtaining the required permission from the Hospital/Medical College, participants were approached and briefed about the nature and purpose of the study and were included in the study after taking a written informed consent. Patient's information was kept confidential. The socioeconomic status was assessed using the modified Kuppaswamy scale.^[11]

Statistical analysis

The collected data were analyzed using SPSS (Statistical Package for Social Sciences) version 11.5 computer software (SPSS, Inc., Chicago, IL, USA) and expressed using descriptive statistics (mean, standard deviation) and proportions. Independent *t*-test was used to compare the mean distress scores across various groups, and $P < 0.05$ was considered statistically significant. Multivariate logistic regression was conducted to assess the influence of various domains of distress on adherence to antidiabetic medication among the patients. The fit of the logistic model was assessed with the Hosmer and Lemeshow goodness-of-fit test; $P < 0.05$ was considered statistically significant association between distress domains and adherence to medication. Both adjusted and unadjusted odds ratios (ORs) and corresponding 95% confidence intervals (CIs) are reported.

RESULTS

Among the 124 patients with type 2 diabetes, more than half ($n = 72$, 58.1%) of the participants were found to have little/no distress, followed by 29% ($n = 36$) with moderate distress and 12.9% ($n = 16$) had high distress. The average score for patients based on diabetes distress scale was 2.0 ± 0.8 ; and the average scores for each domain were as follows: Emotion burden - 2.7 ± 1.3 ; physician distress - 1.3 ± 0.6 ; regimen distress - 1.9 ± 0.9 ; interpersonal distress - 1.8 ± 1.6 .

A higher number ($n = 68$, 54.8%) of the participants were males and a higher proportion were below the age of 60 years ($n = 65$, 52.4%). The median age of the participants was 60 (interquartile range [IQR] - 50–68) years. The family history of diabetes was present in 34.7% ($n = 43$) participants. Among the study participants, 58.1% ($n = 72$) had comorbidities of which hypertension was the major comorbidity ($n = 67$, 93.1%). Participants aged more than 60 years had higher distress score (2.1 ± 0.8) compared to those < 60 years of age (1.8 ± 0.7) which was statistically significant ($P < 0.05$). The baseline general characteristics of study participants are shown in Table 1.

The clinical characteristics of the participants are shown in Table 2. Diabetes-related complications were present among 41.1% ($n = 51$) of the participants, of which retinopathy ($n = 29$, 56.8%) was found to be the most common. The median duration of diabetes was 7 (IQR - 3–12) years. Patients who did not check their blood glucose levels regularly had a higher distress score (2.3 ± 0.7) compared to those who checked it regularly (1.9 ± 0.8). However, this difference was not found to be statistically significant ($P > 0.05$).

On further analyzing the presence of distress across domains, participants with moderate and high distress were grouped into a single category – high distress, to form 2 categories – high and low distress. It was observed that majority of the participants had a low regimen distress ($n = 80$, 64.5%), low physician distress ($n = 110$, 88.7%), and low interpersonal distress ($n = 93$, 75%); however, high emotional distress was present among a higher number of participants ($n = 86$, 69.3%).

On assessment using the Morisky Adherence Questionnaire, 43.5% ($n = 54$) of the participants were found to have low adherence to antidiabetic medications, 29% ($n = 36$) moderate adherence, and 27.4% ($n = 34$) had high adherence. For the purpose of comparison, participants with high adherence and moderate adherence were grouped into single category and considered to have good adherence ($n = 70$, 56.5%) and participants with low adherence were considered to have poor adherence ($n = 54$, 43.5%).

Comparison of various domains of distress with adherence to antidiabetic medications is shown in Table 3. On univariate analysis, participants with low regimen distress (OR 4.25, CI 1.94–9.30), low physician distress (OR 5.71; CI 1.50–21.66), and low interpersonal distress (OR 2.62; CI 1.13–6.05) were found to have good adherence to antidiabetic medication which was statistically significant ($P < 0.05$). However, on multivariate analysis, only low regimen distress (OR 2.94; CI 1.25–6.92) was found to be significantly associated with good adherence to medication among the study participants.

DISCUSSION

In this study, we explored the effect of various domains of DRD on adherence to diabetic medication. The WHO defines adherence as “the extent to which a person’s behavior-taking medication, following a diet, and/or executing lifestyle changes corresponds with agreed recommendations from a healthcare provider”.^[12] Adherence to medication is one of the most important self-care activity among patient with diabetes. They not only have to overcome the emotional shock of being diagnosed with a chronic disease but also follow a lifelong adherence to a strict dietary regimen and modified physical lifestyle to achieve the desired glycemic level. This requires a steady self-determination on the part of the patient. The inability of the patient to cope with his/her disease status can, however, affect his/her psychological state of mind which in turn can bring about an adverse health outcome. Depressive symptoms

Table 1: Baseline general characteristics of the participants ($n = 124$)

Variables	<i>n</i> (%)	Total distress score, mean (SD)	<i>P</i> *
Age group (years)			
≤60	65 (52.4)	1.8 (0.7)	0.018
>60	59 (47.6)	2.1 (0.8)	
Gender			
Male	68 (54.8)	1.9 (0.7)	NS
Female	56 (45.2)	2.1 (0.8)	
Socioeconomic status			
Lower	100 (80.6)	2.1 (0.8)	NS
Middle	024 (19.4)	1.7 (0.7)	
Family history of diabetes			
Yes	43 (34.7)	1.9 (0.8)	NS
No	81 (65.3)	2.0 (0.7)	
Presence of comorbidities			
Yes	72 (58.1)	2.0 (0.7)	NS
No	52 (41.9)	1.9 (0.8)	
Smoker			
Yes	25 (20.2)	2.1 (0.8)	NS
No	99 (79.8)	1.9 (0.7)	
Alcohol consumption			
Yes	16 (12.9)	2.1 (0.8)	NS
No	108 (87.1)	1.9 (0.7)	

Independent *t*-test, *NS: Not significant, SD: Standard deviation

Table 2: Baseline clinical characteristics of the participants ($n = 124$)

Variables	<i>n</i> (%)	Total distress score, mean (SD)	<i>P</i> *
Duration of diabetes (years)			
≤5	46 (37.1)	1.9 (0.8)	NS
>5	78 (62.9)	2.0 (0.8)	
Presence of diabetic complications			
Yes	51 (41.1)	2.1 (0.9)	NS
No	73 (58.9)	1.9 (0.7)	
Total tablets taken in a day			
≤3	71 (57.3)	2.0 (0.8)	NS
>3	53 (42.7)	1.9 (0.7)	
Experience of side effects			
Yes	48 (38.7)	2.1 (0.7)	NS
No	76 (61.3)	1.9 (0.8)	
Insulin injection taken			
Yes	35 (28.2)	1.9 (0.9)	NS
No	89 (71.3)	2.0 (0.7)	
Blood glucose monitoring			
Regular (once in a month)	94 (75.8)	1.9 (0.8)	NS
Occasional	30 (24.2)	2.3 (0.7)	
Fasting blood glucose (mg/dl)			
≤126	20 (16.1)	1.7 (0.6)	NS
>126	104 (83.9)	2.0 (0.8)	

Independent *t*-test *NS: Not significant, SD: Standard deviation

Table 3: Univariate and multivariate analysis showing the comparison between various domains of distresses with adherence to antidiabetic medication (n=124)

Variables	n	Adherence		Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)	P
		Good (n=70)	Poor (n=54)				
Emotional burden							
Low	38	26 (37.1)	12 (22.2)	2.06 (0.92–4.62)	0.074		
High	86	44 (62.9)	42 (48.9)				
Regimen distress							
Low	80	55 (78.6)	25 (46.3)	4.25 (1.94–9.30)	0.001	2.94 (1.25–6.92)	0.013
High	44	15 (21.4)	29 (53.7)				
Physician distress							
Low	110	67 (95.7)	43 (79.6)	5.71 (1.50–21.66)	0.005	3.06 (0.73–12.81)	0.125
High	14	3 (4.3)	11 (20.4)				
Interpersonal distress							
Low	93	58 (82.9)	35 (37.7)	2.62 (1.13–6.05)	0.021	1.77 (0.71–4.43)	0.217
High	31	12 (17.1)	19 (35.2)				

OR: Odds ratio, CI: Confidence interval

are more prevalent among patients with chronic illness, more so with diabetes.^[13] A large number of studies have explored the relationship between diabetes and depression and have concluded that clinical depression is twice as high in patients with diabetes as compared to those without diabetes.^[14] Where depression is classified as a major psychiatric condition, DRD is a nonpathological emotional disorder faced by the patients who are trying to cope with the drastic and stressful change in their routine lifestyle as a result of diabetes.^[15] In our study, 41.9% of the participants had some form of distress (moderate and high distress combined) which is consistent with a study from Bangladesh^[16] where 48.5% of the participants experienced distress. In another study from India, 40% of patients with diabetes had moderate level of distress.^[17] Many other studies have shown the presence of distress and other mood affective disorders among patients with diabetes.^[18-21]

Distress in diabetes patients can result from the diagnosis itself, or from the strict treatment protocol and self-care activity the patient needs to follow or from lack of family support. It can originate at the point of first diagnosis, when the patient contemplates the nature of his condition and complex challenges ahead of endless lifestyle modifications and self-care activities which needs to be carried out on a daily basis, along with the fear of complications.^[22] This can create a lot of frustration, anger or anxiety among the patients to be living with diabetes, which is termed as emotional distress. Another area of DRD is the regimen distress where the patient feels that he/she is not able to strictly follow his/her treatment regimen. He/she is overwhelmed by the number of medications, injections, and frequent blood glucose monitoring and loses confidence in his/her ability to care for his/her condition.^[23,24] Interpersonal distress, also referred to as miscarried helping, is defined as support attempts from family or friends that are considered excessive, untimely or inappropriate by the patient, ultimately giving the feeling that he/she is not supported by the family.^[22] Physician-related distress can arise due to lack of communication between the patient and the treating physician.

This may be due to the constantly overflowing outpatient departments restricting the physician from spending quality time with the patient, or the patient not being able to grasp the treatment and self-care advice given by the physician.^[24] Distress is a natural reaction to any diagnosis, more so with diabetes. However, if distress increases over a period or exacerbates over a specific diabetes-related event, it can compromise the diabetes self-care activities.

Adherence to diabetes medication is one of the most important determinants for the effectiveness of therapy because poor adherence can hinder optimum clinical benefit.^[12] Adherence to treatment not only achieves a desirable glycemic level, but on a longer run reduces the morbidity and mortality among patients with diabetes.^[25] Thus it is imperative to identify the root cause of nonadherence to medication among diabetes patients. Most often it is taken for granted that nonadherence is due to patient-related factors arising out of his/her own behavior or indifference toward the disease. Health system or treatment-related factors or social factors are also implicated. However, the effect of DRD usually goes unnoticed. DRD is a combination of all these factors which can bring about a decreased diabetes self-care activity, including nonadherence to medication. In our study, low regimen distress was found to be associated with good adherence to diabetes medication among the study participants. Studies from the United States^[26,27] have reported an improvement in medication adherence with a decrease in regimen distress.

The limitation of the study was that since the study sample has been selected from selected hospitals, they are in no way representative of the diabetes patient in the community. Some sort of selection bias would have set in since nonprobability sampling strategy was employed.

CONCLUSION

To conclude, we have identified DRD to be a problem in our study participants which affects the adherence to medications.

Identifying the area of distress affecting adherence can help formulate and implement remedial measures addressing this problem. Distress unlike depression does not require treatment. Furthermore, unlike other factors affecting adherence, it can be easily tackled. Most of the time, it arises due to an individual's ability to cope with the emotional burden of being diagnosed with the diabetes. Steps have to be taken at the time of diagnosis to counsel the patients regarding the chronicity of the disease and educate about modifications to lifestyle the patient needs to bring about. Every diabetes clinic needs to have a psychologist who can adequately spend time to educate the patient to cope with his/her disease status and reduce the emotional distress arising out of the disease. Yoga and meditation seems to be an ideal choice among most chronic disease patients. Instead of having a set of predetermined regimen, individualized treatment and self-care regimen can help in reducing the regimen distress. Physicians should improvise their communication strategy and advice patients according to the socioeconomic and educational status of the patient. Family members also need to be counseled as to the needs of the patient. Policymakers should identify DRD as an important factor affecting adherence to medications and address it in policy so that suitable strategies can be implemented to tackle this problem.

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Conflicts of interest

There are no conflicts of interest.

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