Original Article

Prevalence and Predictors of Diabetes Distress among Type 2 Diabetic Patients in Southern Punjab, Pakistan

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ABSTRACT

Objective: To evaluate the prevalence of diabetes distress and its associated predictors among type 2 diabetic patients in Southern Punjab, Pakistan.

Study Design: A cross-sectional study

Place and Duration of Study: This study was conducted at Endocrine Department, Nishtar Medical University and Hospital Multan from September 1st, 2020 to November 30th, 2020**.**

Materials and Methods: A sample of 152 patients from both genders were selected through non-probability convenient sampling. Only those patients whose age was above 20 years, had type 2 diabetes from the last one year and were visiting for their checkups in the endocrine department. Urdu version of Diabetes Distress Scale (DDS-17) was used to measure the diabetes distress. To see whether there was any association between the variables, both Chi-square and Pearson's correlation coefficient tests and Multiple linear regression was used to find the predictors of diabetes distress.

Results: Out of 152 participants, the majority were males, married, uneducated, unemployed, obese, hypertensive, physically inactive, and had poor glycated hemoglobin level. Among them, 66.4% participants had high diabetes distress. Multiple linear regression analysis showed that the participants' age ($\beta = .01$, $p < .05$), level of education ($\beta = .24$, $p < .05$) and glycemic level ($\beta = .12$, $p < .05$) were strong predictors of diabetes distress among the participants.

Conclusion: Diabetes distress is very common among type 2 diabetes patients, and age, level of education and HbA1c were strong predictor of diabetes distress among type 2 diabetes patients in the study.

Key Words: Diabetes Distress, Type 2 Diabetes, glycemic control, Pakistan

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INTRODUCTION

According to International Diabetes Federation (IDF), diabetes mellitus (DM) is the most common and chronic disease which affected 537 million patients worldwide in 2021 and it is estimated that this number will rise to 783 million in 2045.[1]

Pakistan has the highest comparative diabetes prevalence rate 30.8% and is included among the first three countries of the world where the highest number of adults is diagnosed diabetic being 20-79 years old.[1]

Globally, there is a rapid increase in the number of DD patients.[2] The prevalence of DD in the world varied from 8.8% to 65.5%.[3,4] Very few studies on the prevalence of DD among the patients of type 2 diabetes (T2D) have been conducted in Pakistan[5,6], one study found DD prevalence in T2D patients is 76.2%, in the capital city of Pakistan[7] it is higher than any other developing or developed country.[3,4] There is a dire need to investigate the prevalence of DD among T2D patients in any other regions of Pakistan.

Studies concluded that chronic illnesses like diabetes mellitus (DM) affects the people not only physically and economically but also psychologically. One of the outcomes of diabetes is diabetes distress (DD)[8] i.e., patient's worries about diabetes mellitus, its treatment, the need for support, and access to healthcare, is one of the emotional burdens.[9]

Diabetes distress DD has potential to aggravate the effects of DM. Inadequate treatment of psychiatric illnesses (i.e., DD) may increase morbidity and death due to poor management of diabetes (i.e., HbA1c).[10] Significant association between DD and T2D patients

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age, level of education, economic status, duration of diabetes, comorbidities, Body Mass Index (BMI), self-esteem, self-management,[5] smoking, level of physical activity and blood sugar level has already been reported.[4,5]

To find out the predictors of DD among T2D patients in Pakistan is required to fill the research gap. The aim of this study is to find the prevalence as well as predictors of DD among T2D patients in South Punjab, Pakistan.

MATERIALS AND METHODS

A cross-sectional study was conducted at Nishtar Medical University Hospital Multan, Pakistan. The research study was conducted during September 1st, 2020 to November 30th, 2020. The Institutional Ethical Review Board (IERB) issued ethical approval and informed consent was given by each participant.

Study population was T2D patients who were coming to Department of Endocrinology, Diabetes and Metabolism outpatient department (OPD), Nishtar Medical University and Hospital Multan, Pakistan. Patients who were 20 years old or more, had diabetes for the last one year were included in the study. Patients having history of mental illness, using anti-depressant drugs or diagnosed with central nervous system diseases like stroke or tumor, type 1 diabetes and pregnant women were excluded. Calculated sample size was 141 T2D patients (95% confidence level), and 76% expected prevalence of DD.[7] Estimated 10% of non-response rate was included, total sample size of 155 patients were recruited for this study.

Three senior doctors collected the data by using interviewer-administered questionnaire. Socio-demographic information and glycated hemoglobin level (HbA1c) of the patients were investigated. BMI was measured through Asian Body Mass Index and was defined as underweight- BMI <18.50 kg/m^2; Normal weight- 18.50 ≤ BMI < 22.99; Overweight- 23.00 ≤ BMI < 24.99; obese- BMI ≥ 25.00. The participants were considered hypertensive if they had blood pressure greater than 130/90 mmHg, otherwise it was 'no'.[11] Physical activity was measured according to the WHO recommendations i.e. sedentary, if the participants were not engaged in physical activity; medium, if the participants did exercise less than 150 minutes weekly; and high, if the participant did exercise 150 minutes or more weekly).[12]

To measure the DD Urdu version of Diabetes Distress Scale (DDS-17) was used.[2] DDS-17 questionnaire was validated and reliable scale to measure DD.[13,14] The alpha coefficient of the DDS-17 was 0.89. Every item of the DDS-17 questionnaire was scaled on a 6-point Likert scale from 1 (no problem) to 6 (serious problem). Glycemic control in diabetic individuals was often monitored using glycated hemoglobin (HbA1c).[15] This research had classified poor glycemic control as HbA1c levels of 7% or greater, as suggested by the American Diabetes Association recommendations.[16]

RESULTS

Statistical Package for Social Sciences (SPSS) version 22 was used to analyze the data. Frequencies, percentages, mean and standard deviation depicted descriptive data. Shapiro-Wilk test was applied for normality check of the data, Pearson correlation coefficient and multiple linear regression were also used.

The details of socio- demographic characteristics in frequencies and percentages were presented in Table 1 and Chi-square results of the study showed that the participant age, education, and HbA1c level were significantly associated with level of total diabetes distress ($p < 0.05$) (Table 1).

Figure 1 showed the prevalence of diabetes distress (DD) among participants by DDS-17 scale. Of the DD cases identified by DDS-17, 66.4% participants were found to be at high DD level, 25% participants were at moderate DD level and only 8.6% participants were at a mild level. DDS-17 sub-components- emotional burden and regimen distress of the participants had the highest level of diabetes distress 86.8% and 73.7% respectively. Pearson's correlation coefficients showed statistically significant positive correlation with participants' age, duration of diabetes and HbA1c level. DDS-17 subscales- emotional burden and regimen distress were significantly positively correlated with participants' age, duration of diabetes and BMI while physician distress was significantly correlated with HbA1c and interpersonal distress was positively correlated with participants' age (Table 2).

Table No.1: Socio-demographic characteristics and factors associated with level of DD

Characteristics	f (%)	Level of Total Diabetes Distress			Chi-square
		No distress	Moderate	High	
Gender					1.83
Male	91 (59.9%)	10 (76.9)	23 (60.5)	58 (57.4)	
Female	61 (40.1%)	3 (23.1)	15 (39.5)	43 (42.6)	
Age (years) (49.56 ±10.85)					**13.36****
20 – 40	35 (23%)	8 (61.5)	10 (26.3)	17 (16.8)	
41 – 60	99 (65.1%)	4 (30.8)	24 (63.2)	71 (70.3)	
Above 60	18 (11.8%)	1 (7.7)	4 (10.5)	13 (12.9)	

Level of education					**5.04***
Educated	82 (53.9%)	9 (69.2)	25 (65.8)	48 (47.5)	
Uneducated	70 (46.1%)	4 (30.8)	13 (34.2)	53 (52.5)	
Employment status					2.80
Unemployed	127 (83.6%)	13 (100)	31 (81.6)	83 (82.2)	
Employed	25 (16.4%)	0	7 (18.4)	18 (17.8)	
Marital Status					.354
Single	15 (9.9%)	1 (7.7)	3 (7.9)	11 (10.9)	
Married	137 (90.1%)	12 (92.3)	35 (92.1)	90 (89.1)	
Body Mass Index (27.24 ± 5.78)					3.95
Underweight	5 (3.3%)	0	1 (2.6)	4 (4)	
Normal weight	31 (20.4%)	3 (23.1)	5 (13.2)	23 (22.8)	
Overweight	26 (17.1%)	1 (7.7)	6 (15.8)	19 (18.8)	
Obese	90 (59.2%)	9 (69.2)	26 (68.4)	55 (54.5)	
Duration of diabetes (9.54 ± 6.53)					3.63
1 – 10	97 (63.8%)	11 (84.6)	26 (68.4)	60 (59.4)	
Above 10	55 (36.2%)	2 (15.4)	12 (31.6)	41 (40.6)	
Hypertensive					.061
No	74 (48.7%)	6 (46.2)	19 (50)	49 (48.5)	
Yes	78 (51.3%)	7 (53.8)	19 (50)	52 (51.5)	
Physical activity level					2.99
Inactive	100 (65.8%)	7 (53.8)	27 (71.1)	66 (65.3)	
Medium	47 (30.9%)	6 (46.2)	9 (23.7)	32 (31.7)	
High	5 (3.3%)	0	2 (5.3)	3 (3)	
Glycated hemoglobin level (8.29 ± 1.56)					**32.69****
Good (< 7)	19 (12.5%)	7 (53.8)	8 (21.1)	4 (4)	
Fair (7 – 8)	65 (42.6%)	2 (15.4)	19 (50)	44 (43.6)	
Poor (> 8)	68 (44.7%)	4 (30.8)	11 (28.9)	53 (52.5)	

*p < .05, **p < .01, ***p < .001; *f* = frequencies; DD = diabetes distress

Table No.2: Association between Diabetes Distress Scale score and related factors

Characteristics	DDS-17 score	Emotional Burden	Physician Distress	Regimen Distress	Interpersonal Distress
Age	.266**	.170*	.153	.163*	.179*
Duration of diabetes	.181*	.191*	-.051	.169*	.125
BMI	.101	.222**	.145	.354**	.154
HbA1c	.325**	-.074	-.217**	-.031	-.071

*p < .05, **p < .01, ***p < .001; Pearson's correlation coefficient

Table No.3: Multiple linear regression between glycated hemoglobin (HbA1c) and DDS-17 score

Variables	Coefficients			*t*	*p- value*
	Unstandardized Coefficients		Standardized Coefficients		
	B	S.E	*B*		
Constant	.68	.444		1.54	.127
HbA1c	.12	.033	.283	3.58	.001
Age	.01	.005	.181	2.19	.030
Gender	.05	.039	.039	.461	.646
Education	.24	.097	.180	2.40	.018
Employment status	.15	.145	.088	1.04	.297
Duration of diabetes	.13	.107	.096	1.20	.232
BMI	.01	.008	.123	1.63	.104
R^2	.22	F (7, 144) = 1.90; p < 0.001			

BMI = Body Mass Index; Multiple regression adjusted for age, gender, education, employment status, duration of diabetes, BMI.

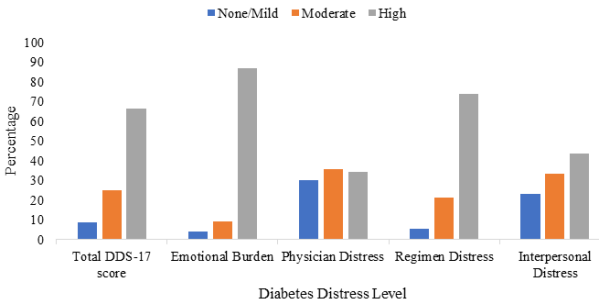

Figure No.1: Prevalence of Diabetes Distress level by DDS-17

Table 3 showed multiple linear regression analysis model, the association of HbA1c with total score of DDS-17. In the adjusted model by controlling participants age, gender, education, employment status, duration of diabetes and BMI, the regression model showed that the HbA1c was significant predictor of DD ($\beta = .283$, $p = .001$) and explained variance 22%.

DISCUSSION

The purpose of the study was to evaluate the prevalence of diabetes distress and its associated predictors among type 2 diabetic patients in Southern Punjab, Pakistan. Results revealed that majority of the participants 91.4% were suffering from DD (moderate to high) and these findings are greater than the 76.4% prevalence of moderate to high DD found in comparable local research.[7]

This study also found that emotional distress was the highest, 86.8%, followed by regimen related distress, 73.7%, interpersonal distress, 43.4%, and physician related distress, 34.5%, very similar findings were reported by one international investigation done in Canada on south Asian population and other in Pakistan which showed emotional and regimen related stress as dominant distress.[7,17]

Earlier study showed insignificant relationship between age and DD among T2D patients in Pakistan.[7] Whereas, in this study, age of the participants was significantly associated with DD, an earlier findings are in the support of these results and reported a link between age and DD.[18] Results revealed that young adults (41-60 years old) faced more DD as compared to older adults (above 60 years old).[19] Patients of a higher age reported less discomfort, which appeared to be an expected given that they already had additional comorbidities. However, younger patients were less accustomed to being unwell and had less experience managing chronic diseases than their peers. Living with diabetes required adherence to a number of daily routines that were unlikely to be accepted by younger persons.[18]

The current study showed that gender, employment status, marital status, education level, hypertension and physical activity were all determined to be insignificant predictors in DD. The previous research on the relationship between DD and these parameters had mixed results. [13,18,20] Overall, there was no statistically significant link between demographic variables and DD in investigations of rural African American women and Asian patients.[20] Other researches, on the other hand, have revealed a link between the DDS score and level of education, employment status and gender.[18,19]

Various studies reported that lower education level was associated with more DD.[18,20] Low education level was revealed to be strong predictor of high DD among participants in the current research. Low education might be to blame for the outcomes, as it led to a lack of understanding about the condition and its consequences.[21]

The present research found that the duration of diabetes and two of its dimensions (emotional and regimen-related distress) were substantially correlated with DD.[2] The study revealed that DD was higher among the participants who had fair and poor glycemic level. The study was consistent with earlier studies findings that showed that glycemic level was positively correlated with DDS-17 total score and its subcomponent physician distress.[19,21]

DD is a medically significant problem that doctors must address in order to effectively treat T2D.[22] The study recommended that enrolling people in a diabetic clinic's teaching programme improved glycemic management and was linked to a reduction in DD.[18]

The current study has some limitations. First, due to cross-sectional research design this research was done in a hospital in the public sector during COVID19. Second, there were various other factors were involved in DD and these were not considered in this study. Thus, the findings of the study was not generalized.

CONCLUSION

The study concludes that prevalence of DD is high among T2D patients. HbA1c, level of education, age, T2D duration, and BMI are significant associated predictors of DD among T2D patients in Pakistan. The findings in this research highlighting the need of clinical attention to DD, particularly in Pakistan with a high incidence of T2D and poor HbA_1c level among T2D patients.

Author's Contribution:

Concept & Design of Study:	Muhammad Tahir, Kashif Siddique
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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