

Diabetes distress among type 2 diabetic patients

Islam MR^{1*}, Karim MR², Habib SH³, Yesmin K⁴

¹Research and Training Monitoring Department, Bangladesh College of Physicians and Surgeons (BCPS), Mohakhali, Dhaka, Bangladesh ²National Nutrition Services, Institute of Public Health Nutrition, Mohakhali, Dhaka, Bangladesh ³BIRDEM, Dhaka, Bangladesh, ⁴Musapur Union Sub-center Raipura, Narsingdi, Bangladesh

*Corresponding author: mrislam96@gmail.com

Received: 05.01.13; Accepted: 02.07.13

ABSTRACT

Background: Diabetes mellitus is being increasingly recognized as a serious global health problem and is frequently associated with co-morbid distress, contributing double burden for the individual and the society. **Aim:** This study documents the proportion of diabetes distress and factors associated with it. **Methods:** A cross-sectional study was conducted from January to June 2012. Data were collected through interview and record review of 165 adults with type 2 diabetes. **Results:** The proportion of diabetes distress among the study population was 48.5%, which includes 22.4% high distress and 26.1% moderate distress. The remainder had little or no distress. The Mean \pm SD of total diabetes distress score was 2.17 ± 0.75 . The Mean \pm SD for each domain score such as emotional burden, physician-related distress, regimen-related distress and interpersonal distress was (3.49 ± 1.52) , (1.13 ± 0.32) , (2.12 ± 0.85) , (1.40 ± 0.65) respectively. Emotional burden was considered as the most important domain in measuring diabetes distress. The influence of age ($p < 0.001$), occupation ($p < 0.05$), smoking ($p < 0.005$), BMI ($p < 0.001$), duration since detection of diabetes mellitus ($p < 0.001$), glycaemic status ($p < 0.001$) treatment modalities ($P < 0.001$), diabetic complications ($p < 0.001$) on level of diabetes distress was statistically significant. There was a strong, positive correlation between the two variables ($r = 0.64$, $p < 0.001$); diabetes distress score with duration of diabetes mellitus. There was a medium, positive correlation between the two variables [$r = 0.43$, $p < 0.001$]; diabetes distress score with glycaemic status (HbA1c level). **Conclusion:** This study identified diabetes distress as a significant health problem among adult type 2 diabetes mellitus patients. This should be taken into consideration for effective management of patient.

Key words: Diabetes mellitus, diabetes distress, HbA1c, glycaemic status

INTRODUCTION

Diabetes mellitus (DM) is one of the most common non-communicable diseases

(NCDs) globally.^[1] It is the fourth or fifth leading cause of death in most high-income countries and there is substantial evidence that it is epidemic in many economically

developing and newly industrialized countries.^[1] Diabetes is undoubtedly one of the most challenging health problems in the 21st century.^[1] The number of studies describing the possible causes and distribution of diabetes over the last 20 years has been extraordinary.^[1] These studies continue to confirm that it is the low- and middle-income countries (LMICs) that face the greatest burden of diabetes.^[1] However, many governments and public health planners still remain largely unaware of the current magnitude, or, more importantly, the future potential for increases in diabetes and its serious complications in their own countries.^[1]

More than 80% of diabetes deaths occur in low- and middle-income countries.^[2] The World Health Organization (WHO) projects that diabetes deaths will increase by two thirds between 2008 and 2030.^[2] Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use can prevent or delay the onset of type 2 diabetes mellitus (T2DM).^[2]

Epidemiological evidences suggest that the incidence of diabetes is increasing worldwide. It is now believed that low and middle-income countries will face the greatest burden of diabetes.^[3] The management of diabetes mellitus and the management and prevention of the complications are important challenges for the present time.^[3] There are ample evidences from applied clinical research that morbidity and mortality risks associated with diabetes are preventable.^[3]

Diabetes distress (DD) is defined as patient concerns about disease management, support, emotional burden, and access to care, is an important condition distinct from depression.^[5] Diabetes-distress is a part of diabetes and it is a non-psychiatric distress.^[5] Addressing diabetes-distress improves both self-care and glycaemic control.^[5] Many people experience considerable distress about having diabetes and the amount of hands-on management that diabetes requires.^[5] This often includes frustration with the ongoing obligations of diet, physical activity, blood glucose monitoring and taking medicines.^[5]

Fisher and his colleagues reported that they have created a brief diabetes distress screening instrument that can be used in a clinical setting.^[6] This scale builds upon a 17-item Diabetes Distress Scale that had been developed by Drs. William Polonsky, and Fisher in 2007 (DDS17).^[6] To create the briefer version of the scale, Dr. Fisher and his team assessed 496 community-based patients with type 2 diabetes utilizing the 17-item Diabetes Distress Scale.^[6] From this research, they created a 2-item diabetes distress screening instrument (DDS2) that asks patients to rate on 6-point scale.^[6] If a patient answers affirmatively to the DDS2 questions, the DDS17 can be administered to help define the content of the distress and to direct intervention.^[6] For example, clinicians and patients can identify areas where interventions might be helpful: emotional burden (feeling overwhelmed by diabetes), physician-related distress (worries about access, trust, and care), regimen related distress (concerns about diet, physical activity, medications), and interpersonal distress not receiving understanding and appropriate support from others).^[6]

Even though clinical depression remains a prevalent condition among patients with diabetes, Dr. Fisher and his colleagues continue to show that most patients with diabetes are not clinically depressed but, instead, are distressed about their diabetes and its management.^[6] They believe that depression is related to, but distinct from, diabetes distress.^[6] Fortunately for both clinicians and patients, there are new tools that can be used to help diagnose diabetes distress and suggest appropriate interventions.^[6]

Little is known about the factors that put patients at the risk of distress. Although many clinicians now regularly screen for clinical depression in their patients with diabetes, until recently there was no easy way to screen patients for diabetes distress and identify areas of diabetes management where intervention would be beneficial.^[6]

At a single point in time, the prevalence of diabetes distress may range from 18% to 35%.^[7] A longitudinal study showed that, over a period of 18 months, 48% of participants experienced high levels of diabetes distress.^[7]

T2DM constitutes about 85 to 95% of all diabetes Magnitude of a diabetes mellitus in Bangladesh is increasing.^[3] As T2DM is a chronic disease and leads to serious complications to the patients, the disease burden is high as well as the mortality and morbidity is also remarkable. Therefore, T2DM is a major health problem in our country. However in our country, it remains unknown due to lack of countrywide survey many people in Bangladesh are unaware that diabetes exists.

Many studies regarding diabetes mellitus and its prevalence and risk factors have been done in Bangladesh^[10,11,24] but studies related to DD in Bangladesh were so far not revealed. Those studies together with the studies carried out in different parts of the world^[14-17,19,20-23,27] were reviewed for the purpose of the study. This study sought to know the magnitude of the DD in T2DM. Findings of this study will help in the research field and also in planning to develop appropriate policy for prevention, control and rehabilitation of type 2 diabetes mellitus.

METHODOLOGY

A hospital-based cross sectional study was conducted in a specialized hospital of Dhaka city to find out the level of diabetes distress among type 2 diabetic patients and factors associated with it. The period of study was a total duration of six months from January 2012 to June 2012. Samples were taken purposively. Data were collected through interview and record review from patient's own diabetic guidebook in BIRDEM Hospital, Dhaka. This center was selected because patients with diabetes come to this hospital from different locations, clinics, peripheral diabetic centers and from different corners of Bangladesh for proper treatment and better management. Cases were adult T2DM patients who were willing to participate in the study had HbA1c test report done within 3 months of the interview and had record height and weight in their diabetic guide books. Severely ill and mentally retarded patients were excluded from this study. Sample size was determined using epi info software. Assuming prevalence of diabetes distress 18%⁷, 95% confidence level with 5% absolute precision, 80% power estimated sample size was 226. Some samples were rejected due to

missing of important information in data sheet. Among those samples, 165 samples were selected for statistical analysis.

The protocol was approved by the Ethical review Committee. Informed written consent was obtained from each individual prior to data collection. Data were collected by interview, record review and anthropometry. Diabetes Distress Scale English version was translated into Bangla and was used to measure diabetes distress. Diabetes Distress Scale-17 (DDS-17)^[4] is a valid tool ($\alpha=0.93$)^[5] for measuring diabetes distress which is used by many other researchers in their studies.

At first DDS2 was used for screening purpose. If a patient answered to the DDS2 questions with affirmation, the DDS17 is administered to help define the content of the distress and to direct intervention.^[5] A patient's diabetes distress was measured by DDS self-report scale with subscales reflecting four domains including Emotional Burden (5 items), Physician Distress (4 items), Regimen Distress (5 items) and Interpersonal Distress (3 items) considering a mean item score as a level of distress worthy of clinical attention. Cut-off point was selected.^[7]

Little / No Distress : < 2
Moderate Distress: 2-2.9
High Distress: ≥ 3

Each questionnaire took approximately 30 to 35 minutes to fill up. Each of the respondents was informed about the objective of the study and was assured about confidentiality prior taking written consent. An interview schedule was prepared and used for data collection. The instrument was prepared keeping in mind the research question, objectives and variables considered in the study. The instrument was pre-tested among 10 patients in Bangladesh Institute of Health Sciences (BIHS), Dhaka, Bangladesh for clarity, accuracy, and un-ambiguity and to find out the face validity of the questions. Minor modifications were incorporated in the interview schedule. Final research instrument was developed to use in data collection. The research instrument contains mainly structured questions with few unstructured questions. The investigator collected the data through interview. The interview was

conducted anonymously and privately as far as possible.

At the end of the day of data collection period, individual interview schedule was edited through checking and rechecking, to see whether it was filled completely and consistently. Then the data was entered into computer, with the help of software SPSS windows program version 20. After frequency run, data were cleaned and frequency distributions were checked for normal distribution. Moderate and high distress as a distress, respondents practicing religion other than Islam were recorded as non-Muslim, those who were single at the time of interview (including widow/widower and divorcee) were recorded as single, educational status was recorded as up to primary and secondary & above, occupational status was recorded as unemployed and employed group, respondents who residing in other than urban recorded as sub urban for convenience of calculation. BMI is categorized in the following way.^[26]

<18.5= Underweight
18.5-24.9= Normal
25-29.9=Over weight
≥30=Obese

One respondent having BMI <18.5 (18.25) was considered within normal range for the convenience of statistical analysis. To determine glycaemic status, HbA_{1c} level was categorized as HbA_{1c} level < 7% as good glycaemic control, 7 to 8 fair glycaemic control and > 8% considered as poor glycaemic control. After thorough cleaning and editing of the data, an analysis plan was developed keeping in view of the objective of the study.

Statistical analysis

Statistical comparisons between different groups were made using independent-samples t-test, one-way ANOVA for diabetes distress score and chi-square test for level of diabetes distress. Bivariate correlations were done to find out the associations between diabetes distress score and duration of DM and glycaemic status. All the tests were two tailed and $p < 0.05$ was considered to be statistically significant.

RESULTS

Among 165 respondents, 50.9% were female. Their mean age was 52.47 years (SD=9.35 years). Mean \pm SD of distress score (2.62 \pm 0.00) was more in age group having ≥ 60 years. Most of them were from urban area (63.6%) and married (93.9%). There was a statistically significant difference at the $p < 0.05$ level in diabetes distress score for the four age groups ($p < 0.001$). There was no significant difference in scores for muslim and non-muslim. There was no significant difference in scores for married and single. There was a statistically significant difference at the $p < 0.05$ level in diabetes distress score for educational status ($p < 0.05$). There was a statistically significant difference at the $p < 0.05$ level in diabetes distress score for occupational groups ($p < 0.05$). There was no significant difference in scores for Nuclear family and Non-nuclear family. There were more distress on ≥ 60 years age group (2.62 \pm 0.00), sub-urban group (2.36 \pm 0.81), up to primary education group (2.32 \pm 0.74), unemployed occupation group (2.35 \pm 0.73), >5 members family size group (2.32 \pm 0.73), <15000 Bangladeshi take average monthly family income group (2.38 \pm 0.66) [Table 1].

There was statistically significant difference at the $p < 0.05$ level in diabetes distress score for duration of DM ($p < 0.001$), Treatment modalities ($p < 0.001$), diabetic complications ($p < 0.001$), HbA_{1c} ($p < 0.001$), BMI ($p < 0.001$), smoking status ($p < 0.05$). There were more distress on >10 years duration of DM group (2.81 \pm 0.61), treatment modalities (oral+insulin) group (2.72 \pm 0.66), having diabetic complication group (2.63 \pm 0.64), poorly controlled HbA_{1c} group (2.56 \pm 0.62), ever smoker group (2.39 \pm 0.80), obese group (3.11 \pm 0.47) [Table 2].

The influence of age on level of diabetes distress was highly significant ($p < 0.001$) and influence of occupation, family size on level of diabetes distress was also statistically significant ($p < 0.05$). But influence of residential status, religion, marital status, family type, monthly family income on level of diabetes distress was not statistically significant ($p > 0.05$). There were highest percentages of distressed symptoms among ≥ 60 years group (72.5%), unemployed occupation group (58.1%), family size >5

members group (59.0%), average monthly family income <15000 taka group (60.7%) [Table 3].

The influence of duration since detection of diabetes mellitus, glycaemic status, treatment modalities, diabetic complications on level of diabetes distress was highly significant ($p < 0.001$) and influence of smoking and BMI was also statistically significant ($p < 0.05$). Average duration since detection of diabetes was 8.82 ± 5.65 years. Mean BMI of the patients was 25.25 (SD 2.69 years). Majority of them were treated with oral anti-diabetic of the respondents presented with

complications of diabetes. There were highest percentages of distressed symptoms among >10 years duration of DM group (88.7%), oral + insulin treatment modalities group (88.0%), having diabetic complications group (80.5%), poorly controlled HbA1c group (58.5%), obese group (100%) [Table 4].

The Mean \pm SD of total diabetes distress was 2.17 ± 0.75 . The mean score for each domain such as emotional burden, physician-related distress, regimen-related distress and interpersonal distress was (3.49 ± 1.52), (1.13 ± 0.32), (2.12 ± 0.85), (1.40 ± 0.65) respectively [Figure 1].

Table 1: Total Distress score and socio-demographic characteristics (n=165)

Characteristics	Number (%)	Total Distress score		P
		Mean	(SD)	
Age (in years)	<40	13(7.9)	1.86(0.50)	<0.001*
	40-49	47(28.5)	1.81(0.70)	
	50-59	65(39.4)	2.21(0.70)	
	≥ 60	40(24.2)	2.62(0.00)	
Sex	Male	81(49.1)	2.07(0.71)	ns
	Female	84(50.9)	2.25(0.79)	
Residence	Sub-urban	60(36.4)	2.36(0.81)	<0.05*
	Urban	105(63.6)	2.05(0.70)	
Religion	Muslim	159(96.4)	2.19(0.75)	<0.05*
	Non-Muslim	6(3.6)	1.47(0.44)	
Marital status	Married	155(93.9)	2.15(0.74)	ns
	Single	10(6.0)	2.37(0.98)	
Educational status	Up to primary	82(49.7)	2.32(0.74)	<0.05*
	Secondary & above	83(50.3)	2.02(0.74)	
Main occupation	Unemployed	86(52.1)	2.35(0.73)	<0.05*
	Employed	79(47.9)	1.96(0.73)	
Type of family	Nuclear	148(89.7)	2.16(0.73)	ns
	Non-nuclear	17(10.3)	2.24(0.93)	
Family size (in number)	0 to 5	104(63.0)	2.07(0.75)	<0.05*
	>5	61(37.0)	2.32(0.73)	
Average monthly family income (in taka)	<15000	56(33.9)	2.38(0.66)	<0.05*
	15000-30000	76(46.1)	2.17(0.78)	
	310000-450000	19(11.5)	1.85(0.74)	
	>450000	14(8.5)	1.75(0.71)	

*Significant at 0.05 level.

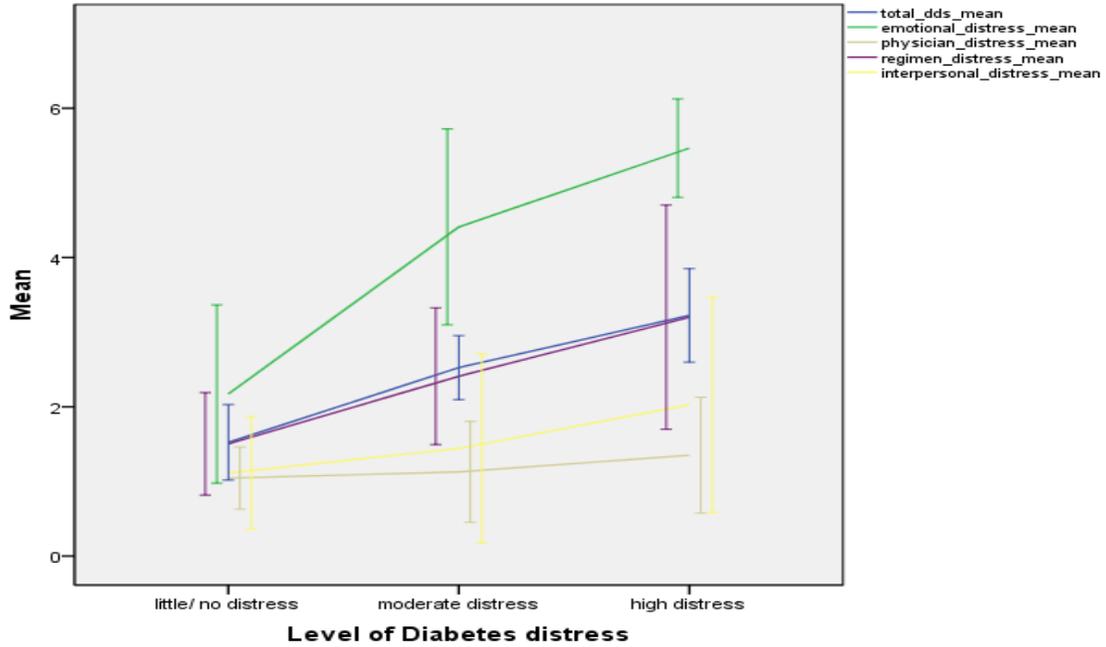


Figure 1: Distribution of respondents according to mean of total diabetes distress score including 4 subscale scores (n=165)

Table 2: Total distress score and clinical characteristics (n=165)

Characteristics	Number (%)	Total Distress score Mean (SD)	P	
Duration of DM (in years)	0-10	112(67.9)	1.86(0.62)	<0.001*
	>10	53(32.1)	2.81(0.60)	
Type of diabetic management	Non pharmacological	4(2.4)	1.97(0.83)	ns
	Pharmacological	161(97.6)	2.17(0.75)	
Treatment modalities (Type of Anti-diabetic agents)*	Oral	91(56.5)	1.87(0.63)	<0.001*
	Insulin	45(28.0)	2.47(0.75)	
	Oral + Insulin	25(15.5)	2.72(0.66)	
Diabetic complications	Absent	83(50.3)	1.71(0.56)	<0.001*
	Present	82(49.7)	2.63(0.64)	
HbA1c (%)	Good <7	65(39.4)	1.71(0.56)	<0.001*
	Fair 7-8	29(17.6)	2.21(0.88)	
	Poor >8	71(43.0)	2.56(0.62)	
Smoking status	Never smoker	100(60.6)	2.02(0.69)	<0.05*
	Ever smoker	65(39.4)	2.39(0.80)	
Body Mass Index (BMI)	Normal	76(46.1)	2.28(0.80)	<0.001*
	Overweight	83(50.3)	2.00(0.66)	
	Obese	6(3.6)	3.11(0.47)	

*Significant at 0.05 level.

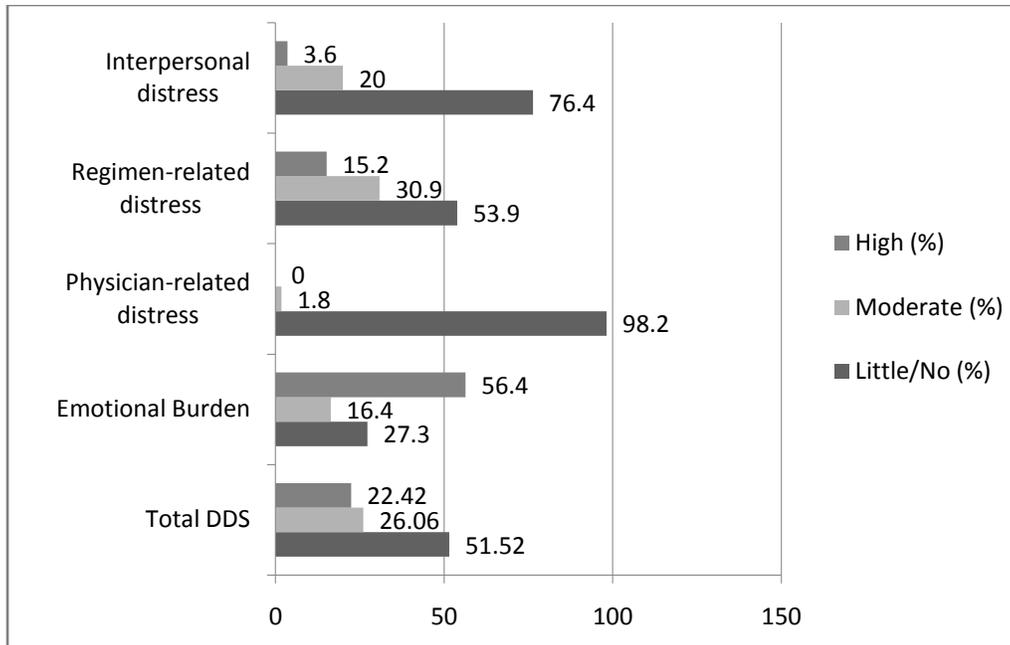


Figure 2: Distribution of respondents according to level of diabetes distress including 4 sub scale scores (n=165)

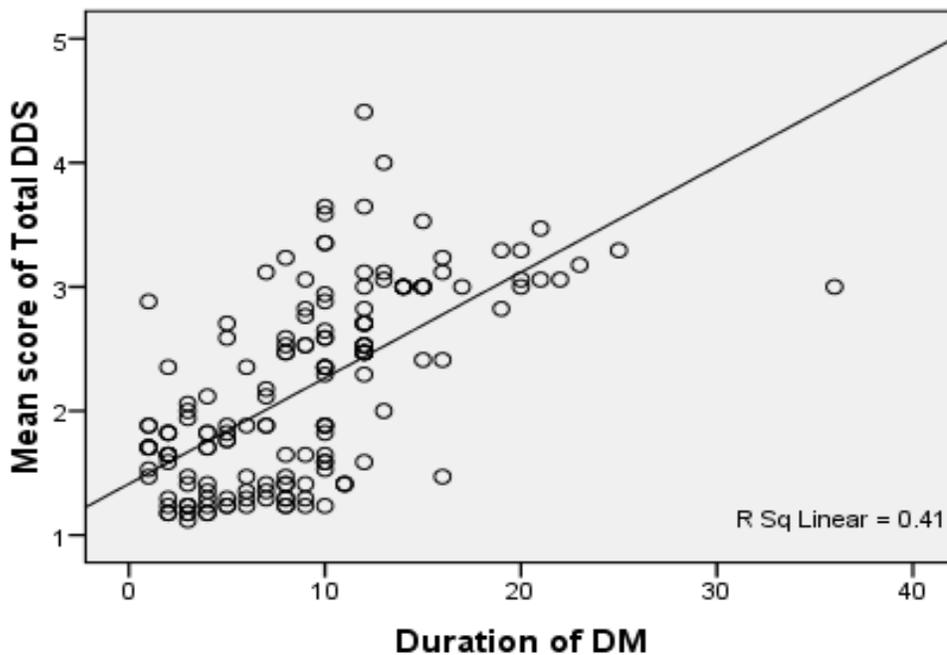


Figure 3: Scatter diagram showing correlation between duration since first detection of diabetes mellitus and diabetes distress (n=165, $r=0.64$, $p<0.001$)

Table 3: Socio-demographic characteristics of the respondents and level of diabetes distress (n=165)

Characteristics	Level of diabetes distress		Total n(%)	P
	Little/No n (%)	Distress n(%)		
Age (in year)				
<40	11(84.6)	2(15.4)	13(7.9)	<0.001*
40-49	34(72.3)	13(27.7)	47(28.5)	
50-59	29(44.6)	36(55.4)	65(39.4)	
≥60	11(27.5)	29(72.5)	40(24.2)	
Sex				
Male	47(58.0)	34(42.0)	81(49.1)	ns
Female	38(45.2)	46(54.8)	84(50.9)	
Residence				
Sub-urban	28(46.7)	32(53.3)	60(36.4)	ns
Urban	57(54.3)	48(45.7)	105(63.6)	
Religion				
Muslim	80(50.3)	79(49.7)	159(96.4)	ns
Non- Muslim	5(83.3)	1(16.7)	6(3.6)	
Marital status				
Married	81(52.3)	74(47.7)	155(93.9)	ns
Single	4(40.0)	6(60.0)	10(6.1)	
Educational status				
Up to primary	36(43.9)	46(56.1)	82(49.7)	ns
Secondary & above	49(59.0)	34(41.0)	83(50.3)	
Main occupation				
Unemployed	36(41.9)	50(58.1)	86(52.1)	<0.05*
Employed	49(62.0)	30(38.0)	79(47.9)	
Types of Family				
Nuclear	77(52.0)	71(48.0)	148(89.7)	ns
Non-nuclear	8(47.1)	9(52.9)	17(10.3)	
Family size (in number)				
0-5	60(57.7)	44(42.3)	104(63.0)	<0.05*
>5	25(41.0)	36(59.0)	61(37.0)	
Average monthly family income (in taka)				
<15000	22(39.3)	34(60.7)	56(33.9)	ns
15000-30000	40(52.6)	36(47.4)	76(46.1)	
31-45000	13(68.4)	6(31.6)	19(11.5)	
>45000	10(71.4)	4(28.6)	14(8.5)	

*Significant at 0.05 level

Table 4: Factors related to diabetes and level of diabetes distress (n=165)

Characteristics	Level of diabetes distress		Totaln(%)	p
	Little/No n (%)	Distress n (%)		
Duration of DM (in years)				
0-10	79(70.5)	33(29.5)	112(67.9)	<0.001*
>10	6(11.3)	47(88.7)	53(32.1)	
Type of diabetic management				
Non pharmacological	3(75.0)	1(25.0)	4(2.4)	ns
Pharmacological	82(50.9)	79(49.1)	161(97.6)	
Treatment modalities (Type of Anti-diabetic agents)				
Oral	63(69.2)	28(30.8)	91(56.5)	<0.001*
Insulin	16(35.6)	29(64.4)	45(28.0)	
Oral + Insulin	3(12.0)	22(88.0)	25(15.5)	
Diabetic complications				
Absent	69(83.1)	14(16.9)	83(50.3)	<0.001*
Present	16(19.5)	66(80.5)	82(49.7)	
HbA1c (%)				
Good <7	56(86.2)	9(13.8)	65(39.4)	<0.001*
Fair 7-8	14(48.3)	15(51.7)	29(17.6)	
Poor >8	15(21.1)	56(78.9)	71(43.0)	
Smoking status				
Never smoker	58(58.0)	42(42.0)	100(60.6)	<0.05*
Ever smoker	27(41.5)	38(58.5)	65(39.4)	
Body Mass Index (BMI)				
Normal	35(46.1)	41(53.9)	76(46.1)	<0.05*
Overweight	50(60.2)	33(39.8)	83(50.3)	
Obese	0(0.0)	6(100)	6(3.6)	

*Significant at 0.05 level

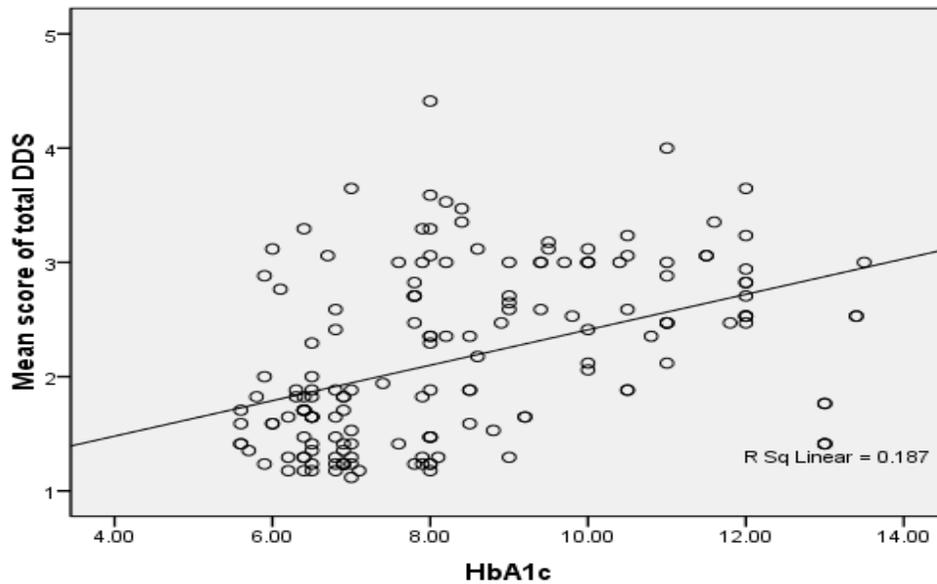


Figure 4: Scatter diagram showing correlation between HbA1c level and diabetes distress (n=165, r=0.43, p <0.001)

The proportion of diabetes distress among the study population was 48.5% which include 22.4% high distress and 26.1% moderate distress. The remainder 51.5% had little or no distress. [Figure 2] There was a strong, positive correlation between the two variables [$r=0.64$, $p<0.001$]; diabetes distress score with duration of diabetes mellitus. [Figure 3] There was a medium, positive correlation between the two variables [$r=0.43$, $p <0.001$]; diabetes distress score with glycaemic status (HbA1c level). [Figure 4]

DISCUSSION

DD is common health problem which frequently co-exists with DM. The study estimated that among the adult T2DM patients 51.5% had little or no distress. 26.1% had moderate distress and 22.4% had high distress. This proportion of diabetes distress in this study was consistent with the study findings of Fisher *et al.* where they found prevalence of high diabetes distress among T2DM.^[7] The Mean \pm SD of total diabetes distress was 2.17 ± 0.75 . The Mean \pm SD for each domain score such as emotional burden, physician-related distress, regimen-related distress and interpersonal distress was (3.49 ± 1.52), (1.13 ± 0.32), (2.12 ± 0.85) and (1.40 ± 0.65) respectively. Emotional Burden was considered as the most important domain in measuring diabetes distress. Our findings are consistent with the study conducted by Shojaeezadeh *et al.*^[18]

There was a strong, positive correlation between the two variables [$r=.640$, $n=165$, $p<0.001$] with diabetes distress score with duration of diabetes mellitus. The influence of duration since detection of diabetes mellitus on level of diabetes distress was statistically significant ($p<0.001$). There was a medium, positive correlation between the two variables [$r=.43$, $n= 165$, $p<0.001$] with diabetes distress score with glycaemic status (HbA1c level). The influence of glycaemic status on level of diabetes distress was statistically significant ($p<0.001$). This finding was consistent with other study findings.^[12,13,22] The influence of treatment modalities on level of diabetes distress was statistically significant ($p<0.001$). This finding was consistent with other study finding.^[9] The influence of diabetic complications on level of diabetes distress

was statistically significant ($p<0.001$). The influence of smoking on level of diabetes distress was statistically significant ($p<0.005$). The influence of BMI on level of diabetes distress was statistically significant ($p<0.001$).

Fisher *et al.* documented that in their 3D and REDEEM study, there was an association with age ($p=0.01$), but in this study age ($p <0.001$); female sex not significant, in this study female sex also not significant; HbA1c significant ($p=0.13$), in this study HbA1c ($p<0.001$); DDS 17 Mean \pm SD (2.10 ± 0.96), in this study DDS 17 Mean \pm SD (2.17 ± 0.75); BMI Mean \pm SD (32.74 ± 7.74), in this study BMI Mean \pm SD (25.25 ± 2.69). Their findings were more or less consistent with our findings.^[7] The socio-demographic characteristics of the study sample were almost same as those reported by Rahman *et al.*^[25] This could be due to the same setting used for the studies.

Although optimum care had been tried by the researcher in every steps of this study, still some limitations existed. The study was conducted in a selected hospital. So the study population might not represent the whole community. Although the study place was recognized as the largest specialized center for the concerned population, still the study finding might lack external validity. Probability sampling technique could not be employed to recruit the study unit; they were selected purposively. As a result, there might be some selection bias. DDS is a well known scale to measure diabetes distress but it was not validated in our country.

CONCLUSION

This study has identified distress as a significant health problem among adult type 2 diabetes mellitus and offers important guidelines for future work in this area. The findings of the study might be used to guide the service providers and policy makers for the modification and improvement of the current diabetes treatment guideline. The factors associated with diabetes distress need to be further studied in depth in order to formulate effective intervention program and rehabilitation.

ACKNOWLEDGEMENTS

We acknowledge authorities of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) for their support. We are also grateful to all the respondents for their sincere cooperation.

REFERENCES

1. International Diabetes Federation. IDF Diabetes Atlas, 5th ed. Brussels, Belgium: International Diabetes Federation, 2011.
2. World Health Organization. Diabetes mellitus. Fact sheet. No. 312, September 2012. <http://www.who.int/mediacentre/factsheets/fs312/en/index.html>
3. Azad AK, Mahtab H, Grant J, Steward M, Tofayel A. Diabetes mellitus. 3rd ed. Dhaka: Diabetic Association of Bangladesh; 2010 July. P. 17.
4. Polonsky WH, Fisher L, Earles J, Dudl RJ, Lees J, Mullan J, Jackson RA. Assessing psychosocial distress in diabetes: development of the diabetes distress scale. *Diabetes Care* 2005;28:626-31.
5. Fisher L, Mullan JT, Skaff MM, Glasgow RE, Arean P, Hessler D. Predicting diabetes distress in patients with type 2 diabetes: a longitudinal study. *Diabet Med* 2009;26:622-7.
6. Fisher L, Glasgow RE, Mullan JT, Skaff M, Polonsky WH. Development of a brief diabetes distress screening instrument. *Ann Fam Med* 2008;6:246-52.
7. Fisher L, Hessler DM, Polonsky WH, Mullan JT. When is diabetes distress clinically meaningful?: establishing cut points for the diabetes distress scale. *Diabetes Care* 2012;35:259-64.
8. Ting RZ, Nan H, Yu MW, Kong AP, Ma RC, Wong RY. Diabetes-related distress and physical and psychological health in Chinese type 2 diabetic patients. *Diabetes care* 2011;34:1094-6.
9. Delahanty LM, Grant RW, Wittenberg E, Bosch JL, Wexler DJ, Cagliero E, Meigs JB. Association of diabetes-related emotional distress with diabetes treatment in primary care patients with type 2 diabetes. *Diabetes medicine* 2007;24:48-54.
10. Rahim MA, Hussain A, Khan AK, Sayeed MA, Keramat Ali SM, Vaaler S. Rising prevalence of type 2 diabetes in rural Bangladesh: a population based study. *Diabetes Res Clin Pract* 2007;77:300-5.
11. Rahim MA, Khan AK, Ali SMK, Nahar Q, Shaheen A, Hussain. Glucose tolerance in a rural population of Bangladesh. *Int J Diabetes Dev Ctries* 2008;28:45-50.
12. Fisher L, Mullan JT, Arean P, Glasgow RE, Hessler D, Masharani U. Diabetes distress but

not clinical depression or depressive symptoms is associated with glycemic control in both cross-sectional and longitudinal analyses. *Diabetes Care* 2010;33:23-8.

13. Fisher L, Skaff MM, Mullan JT, Arean P, Glasgow R, Masharani U. A longitudinal study of affective and anxiety disorders, depressive affect and diabetes distress in adults with Type 2 diabetes. *Diabet Med* 2008;25:1096-101.

14. Fisher L, Skaff MM, Mullan JT, Arean P, Mohr D, Masharani U, Glasgow R, Laurencin G. Clinical depression versus distress among patients with type 2 diabetes: not just a question of semantics. *Diabetes Care* 2007;30:542-8.

15. Mullan JT, Fisher L, Skaff MM, Polonsky WH. The Diabetes Distress Scale: a replication (Abstract). *Diabetes*. 2006;55(Suppl.1):A426-7.

16. Liu MY, Tai YK, Hung WW, Hsieh MC, Wang RH. Relationships between emotional distress, perception and self-care behavior and quality of life in patients with type 2 diabetes. *Hu Li Zhi*. 2010;57:49-60.

17. Tang TS, Brown MB, Funnell MH, Anderson RM. Social support, quality of life and self-care behaviors among African-Americans with Type 2 diabetes. *The Diabetes Educator* 2008;34:266-76.

18. Shojaeezadeh D, Tol A, Sharifirad G, Eslami A. Is Assessing Diabetic Distress An Efficient Pathway To Tailor More Effective Intervention Programs? *Geneva Health Forum* 2012.

19. Horacek J, Alper S. Mindfulness-based Diabetes Management: A targeted intervention for depression, anxiety and diabetes distress. *OHSU Psychiatry Grand Rounds* Sept. 20th, 2011.

20. Fisher L. Diabetes Self-Management Articles. Eight Tips for Managing Diabetes Distress. Available from: http://www.diabetesselfmanagement.com/articles/emotional-health/eight_tips_for_manage_diabetes_distress/all/

21. Wisconsin Diabetes Mellitus Essential Care Guidelines 2011. Section 10: Emotional and sexual health care, page 10-5. <http://www.dhs.wisconsin.gov/diabetes/PDFs/GLID.pdf>

22. Van Bastelaar KM, Pouwer F, Geelhood-Duijvestijnt P, Tack CJ, Bazelmans E, Beekman AT, Heine RJ, Snoek FJ. Diabetes-specific emotional distress mediates the association between depressive symptoms and glycemic control in Type 1 and Type 2 diabetes. *Diabet Med* 2010;27:798-803.

23. Wild S, Roglic G, Green A, Sicree R, King H. Global Prevalence of Diabetes Mellitus: Follow-up report on the diagnosis of diabetes mellitus. *Diabetes Care* 2003;26:3160-7.

24. Akhter A, Fatema K, Afroza A, Bhowmic B, Ali L, Hussain A. Prevalance of Diabetes Mellitus and its Association Risk Indicators in a

Rural Bangladeshi population. The Open Diabetes Journal 2011;4:6-13.

25. Rahman M, Rahman MA, Flora MS, Rakibuz-zaman M. Depression and associated factors in diabetic patients attending an urban hospital of Bangladesh. International Journal of collaborative Research on Internal Medicine and Public Health 2011;3:65-76.

26. World Health Organization. Obesity: Preventing and Managing the Global Epidemic. Report of a WHO Consultation of Obesity. Geneva: World Health Organization; 3-5 June 1997. <http://www.bvsde.paho.org/bvsacd/cd66/obeprev/indice.pdf>

27. Mardi TG, Lutfi MF. Risk factors for gestational diabetes mellitus in Sudanese pregnant women. Int J Med Biomed Res 2012;1:79-84.

doi: <http://dx.doi.org/10.14194/ijmbr.224>

How to cite this article: Islam MR, Karim MR, Habib SH, Yesmin K. Diabetes distress among type 2 diabetic patients. Int J Med Biomed Res 2013;2(2):113-124

Conflict of Interest: None declared



This is an Open Access article distributed under the terms of the Creative Commons Attribution 3.0 License (<http://creativecommons.org/licenses/by-nc-sa/3.0/>) which permits unrestricted, non-commercial, share-alike use, distribution, and reproduction in any medium, provided the original work is properly cited.