

Emotional Distress and Metabolic Control in Diabetic Patients Attending Primary Health Care in the Eastern Province, Saudi Arabia

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Abstract: Background: Recognition and treatment of emotional distress, which affects 20 to 40% of outpatients with type 1 or type 2 diabetes, are important because of its association with worse diabetes self-care, poor glycemic control, increased rates of mortality and diabetes-related complications, and a rise in healthcare expenditure. However, although the symptoms of emotional distress improve in diabetic patients after psychological and pharmacological interventions, evidence of benefits in glycemic control is still uncertain. Objective: The aim of this study was to assess the metabolic control in diabetic patients with emotional distress attending primary mental care clinics (PMCC) in the Eastern Province of Saudi Arabia. Method: This study was a single group pretest-posttest design conducted on adult diabetic patients with emotional distress attending PMCC. Out of 194 attendees, 62 patients who fulfilled the selection criteria were studied. Data were collected from the patients' records using a worksheet designed for the study. Metabolic parameters including BMI, BP, FBS, HbA1c and lipid profile were recorded before and after the management of emotional distress. Socio-demographic characteristics, complications related to diabetes and co-morbidities were also recorded. Paired *t*-test was used appropriately to compare continuous variables. A *p*-value of less than 0.05 was considered significant in all statistical analysis. Results: The majority of the patients had type 2 DM (98.2%) and the presence of co-morbidities was high (83.9%). A comparison of the metabolic parameters before and after management of emotional distress, showed a significant reduction in HbA1c ($p = 0.020$) and elevation in HDL ($p = 0.010$). No differences in BMI, BP, FBS, TC, TG or LDL were found. Conclusions: Treating emotional distress in diabetic patients is associated with an improvement in HbA1c and HDL.

Key words: Diabetes mellitus, emotional distress, depression, anxiety, primary health care.

List of Abbreviations

BMI	Body Mass Index	MDD	Major Depressive Disorder
BP	Blood Pressure	OHA	Oral Hypoglycemic Agent
CBT	Cognitive Behavior Therapy	PHC	Primary Health Care
DM	Diabetes Mellitus	PMCC	Primary Mental Care Clinic
FBS	Fasting Blood Sugar	SD	Standard Deviation
HbA1c	Hemoglobin A1c	SPSS	Statistical Package for the Social Sciences
HDL	High Density Lipoprotein	SSNRI	Selective Serotonin and Norepinephrine Reuptake Inhibitors
HTN	Hypertension	SSRI	Selective Serotonin Reuptake Inhibitor
IHD	Ischemic Heart Disease	TC	Total Cholesterol
LDL	Low Density Lipoprotein	TCA	Tricyclic Antidepressant
		TG	Triglyceride
		WHO	World Health Organization

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1. Introduction

1.1 Background

Emotional distress in diabetic patients has received increasing attention in the last decade and is still often not recognized and untreated in clinical practice [1].

Emotional distress, which may consist of symptoms of depression, anxiety, and diabetes-specific distress, affects 20 to 40% of outpatients with type 1 or type 2 diabetes, making it a common co-morbid health problem in these patients [2-5].

Nowadays, diabetes is a highly prevalent disease estimated to affect 382 million people worldwide—8.3% of adults—and owing to such factors as population aging and urbanization, the number of people with diabetes will increase by 55% and rise beyond 592 million by 2035 [6].

Diabetes mellitus is a chronic illness that requires continuous medical care and unceasing patient self-management education and support to prevent acute complications and reduce the risk of long-term complications [7].

The main goal of the treatment of diabetes is to control blood sugar to the level that meets the recommended glycemic goals. Patients must follow rigorous daily dietary, exercise, and medication regimens for the remainder of their lives. The health outcome in patients with diabetes is closely linked to adherence to management, which is affected by many bio-psychosocial factors. One important factor is emotional distress. Consequently, emotional distress in diabetic patients may potentially adversely affect patient outcome and expose patients to the hazards of diabetes-related complications [8].

Emotional distress results in lower quality of life and more negative appraisals of insulin therapy [9, 10]. Patients with type 2 DM who are depressed have impaired glycemic control, increased rates of mortality, diabetes-related complications and hospitalizations, higher healthcare expenditure and poorer diabetes self care [9, 11-14]. When emotional

distress is treated, adherence to treatment regimen and increased engagement in self-care behaviors are more likely [15].

It has been widely demonstrated that emotional distress, depressive symptoms as well as health-related quality of life improve in type 2 diabetic patients who had lower levels of emotional well-being after antidepressant therapy and cognitive therapy [5, 16]. However, evidence for benefits in glycemic control is still controversial. In some studies, significant decreases in HbA1c have been demonstrated [17, 18]; while in other studies, HbA1c remained stable during the trial despite antidepressants [16, 19, 20] though another study stated a transient improvement in HbA1c [21].

1.2 Aim of the Study

The aim of this study was to assess the metabolic control in diabetic patients with emotional distress, attending primary health care in primary mental care clinics (PMCC) in the Eastern Province of Saudi Arabia.

1.3 Specific Objective

The objective of this study was to compare the metabolic parameters before and after management of emotional distress.

2. Methodology

2.1 Methodology

2.1.1 Study Type

This was a single group pretest-posttest design, which is a type of non-experimental design.

2.1.2 Study Area

The study was done in the Eastern Province in Saudi Arabia.

2.1.3 Study Population

The study population was the adult diabetic patients with emotional distress attending PMCC in the Eastern Province of Saudi Arabia.

2.1.4 Sample Size

All patients who fulfilled the selection criteria were included in the study. Out of 194 diabetic patients attending PMCC, 62 patients fulfilled the selection criteria and were included in the study.

2.1.5 Inclusion Criteria

Subjects included in the study were all adult patients found to have diabetes according to the American Diabetes Association Criteria for the diagnosis of diabetes, who were confirmed to have emotional distress after being referred to PMCC, and started on management and follow up plan at PMCC for at least 3 visits.

2.1.6 Exclusion Criteria

Any patient referred to a psychiatrist for psychosis, involved in substance abuse, or who had not yet started treatment for emotional distress, missed the follow up, did not regularly attend, attended less than 3 visits from the beginning of management or showed no improvement after management was excluded from the study.

2.2 Study Variables

2.2.1 Dependent Variables

Metabolic parameters included were weight, height, body mass index, blood pressure, fasting blood sugar, glycosylated hemoglobin (HbA1c) and lipid profile (total cholesterol, triglyceride, LDL, HDL).

2.2.2 Independent Variables

Socio-demographic characteristics included were age, sex, marital status, level of education and occupation. Personal related factors included were type, duration and complications of diabetes, co-morbidity, type of emotional distress and the type of management of emotional distress.

2.3 Data Collection

2.3.1 Data Collection Tool

The data were collected using a worksheet developed and designed by the investigators. It was arranged on two pages. The first page consisted of three

parts: socio-demographic data, morbid and co-morbid data and emotional distress data. The second page had one part concerned the metabolic parameters data. This part was composed of two periodic parts: the first comprised the metabolic parameters and management before emotional distress improvement, the second consisted of the metabolic parameters and management after improvement of emotional distress.

2.3.2 Procedure of Data Collection

The Eastern Province has 5 PMCCs in 3 main cities. Dammam has 3 PMCCs, while Qatif and Khobar have one each.

Visits were made to the PMCCs to determine the number of diabetic patients followed at each center. After determining the total number of diabetic patients followed at PMCCs, the data were collected by the investigators in a period of 14 weeks.

The data were collected in two steps: first by reviewing the patient's record at PMCC in order to obtain the data relating to emotional distress; the second by reviewing the patient's record at PHC to gather the remaining data regarding diabetes.

After the data collection, each worksheet was coded with the patient's code and placed in an envelope and marked "confidential".

2.3.3 Data Management

IBM SPSS Statistics version 20 was used for statistical analysis. All variables were coded, checked and entered by the investigators.

2.3.4 Data Analysis

Categorical variables were tabulated and presented in numbers and percentages. Tables with means and standard deviations were used to describe the continuous variables. Then, descriptive results were presented in tables or graphs. Paired *t*-test was used appropriately to compare continuous variables. A *p*-value of less than 0.05 was considered significant in all statistical analyses.

2.3.5 Ethical Considerations

Official ethical approval to carry out the study was obtained from different authorities including the

Research and Ethics Committee of the Family and Community Medicine Department at University of Dammam, Research and Ethics Committee of Saudi Commission for Health Specialties and the General Directorate of Health Affairs in the Eastern Province, Ministry of Health. All data taken from patients' records were kept confidential. Each worksheet was coded with patient and center code.

3. Results

Out of 194 diabetic patients, 62 patients who fulfilled the selection criteria were included in the study. The majority of the study population was females, which accounts for 64.5% (40). The mean age was 53.2 ± 11.6 years. Most of the patients (40) 66.7% were married while widowed, divorced and single patients were 16.7% (10), 13.3% (8), 3.3% (2) respectively. Of the 62 patients studied, housewives were 34 constituting 55.7%, which represented 87.2% of the female patients. Government employees, businessmen and retired patients were 16.4% (10), 6.6% (4), 16.4% (10) respectively and only 2 patients were unemployed. The majority of the patients were poorly educated since 17 (30.4%) were illiterate and those who had primary school education were 20 (35.7%).

Table 1 shows the socio-demographic characteristics of the patients.

Fifty-five patients (98.2%) had type 2 DM while only 1.8% had type 1 DM. The mean duration of diabetes was 11.2 ± 6.7 years. Diabetic complications were present in 9 (20.5%) of the study population. Diabetic neuropathy was the commonest, accounting for 15.9% (7) while diabetic retinopathy and nephropathy were equal in proportion accounting for 4.5% (2) each. More than 83% (47) of the patients had co-morbidities, commonly hypertension (58.9%), dyslipidemia (37.5%), bronchial asthma (7.1%), ischemic heart disease (7.1%) and hypothyroidism (5.4%). Fig. 1 shows the distribution of DM complications and co-morbidities among the patients.

Forty-one patients (83.7%) used oral hypoglycemic agents. Most of the patients took metformin and glibneclamide. About 77% (35) took metformin and more than 62% (28) took glibneclamide while those who used insulin with or without OHA were 20.4% (10).

Regarding emotional distress, 43.5% (27) of the patients were found to have depression while anxiety and adjustment disorder were diagnosed in 17.7% (11) and 8.1% (5) respectively. Fig. 2 shows the distribution of emotional distress in the patients.

Table 1 Socio-demographic characteristics of the study population (*n* = 62).

	Characteristics	Number	Percentage
Sex	Male	22	35.5%
	Female	40	64.5%
Marital status	Single	2	3.3%
	Married	40	66.7%
	Divorced	8	13.3%
	Widowed	10	16.7%
Occupation	Government	10	16.4%
	Business	4	6.6%
	Retired	10	16.4%
	Student	1	1.6%
	Housewife	34	55.7%
	Unemployed	2	3.3%
Educational level	Illiterate	17	30.4%
	Primary school	20	35.7%
	Intermediate school	4	7.1%
	High school	7	12.5%
	College or university	8	14.3%

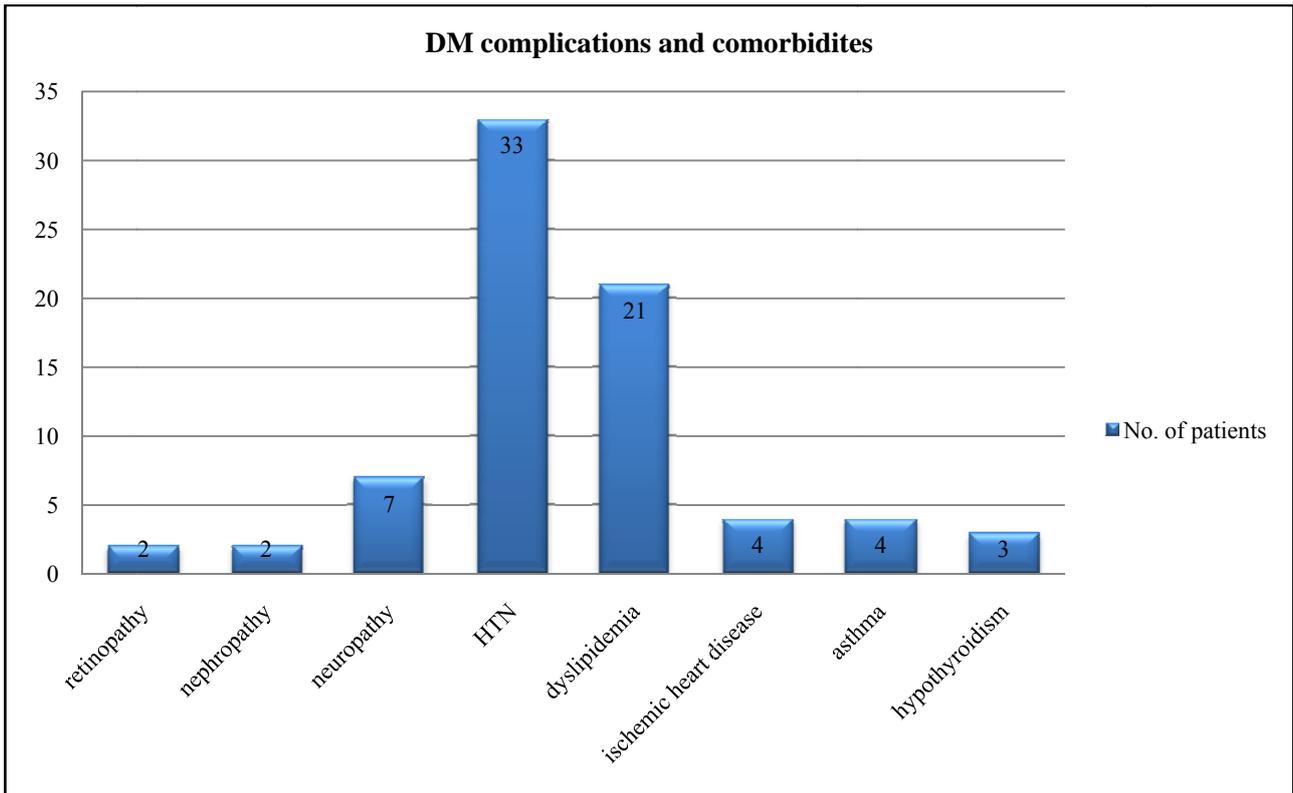


Fig. 1 Distribution of DM complications and co-morbidities among patients.

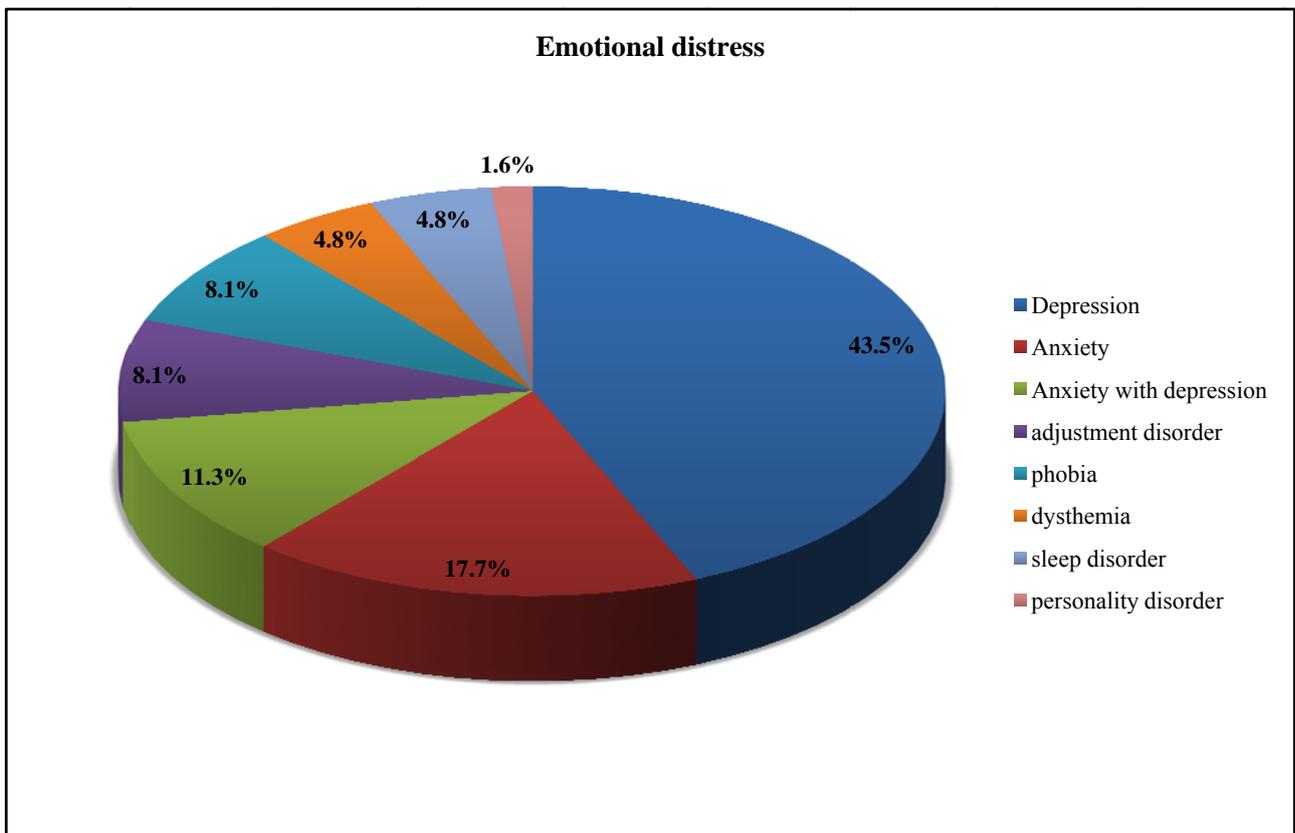


Fig. 2 Distribution of emotional distress among patients.

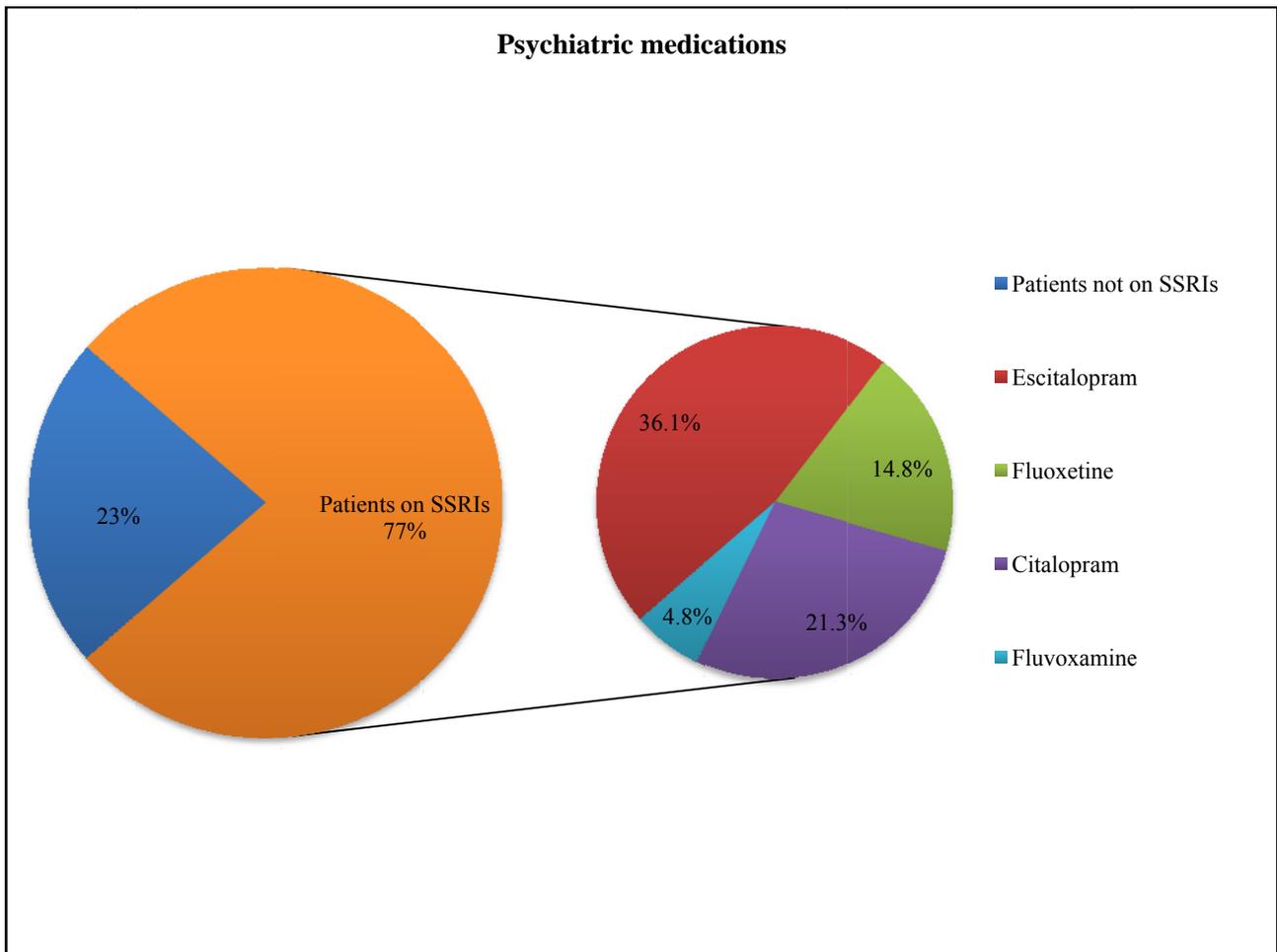


Fig. 3 Types of psychiatric medications used by patients.

Table 2 Comparison of metabolic parameters before and after management of emotional distress with paired *t*-test.

	Before	After	Paired differences	df	P-value
	Mean (SD)	Mean (SD)	Mean (SD)		
BMI	29.75 (5.69)	30.18 (5.34)	-0.43 (1.9)	39	0.165
FBS	183.4 (80.7)	174.7 (64.4)	8.70 (67.02)	39	0.417
HbA1c	8.73 (2.42)	7.80 (2.18)	0.93 (2.21)	33	0.020
TC	194.3 (37.8)	198.7 (46.2)	-4.43 (44.15)	38	0.534
TG	186.3 (84.3)	175 (105)	11.3 (60.32)	36	0.262
LDL	113.8 (30.4)	113.6 (35.4)	0.21 (43.29)	31	0.978
HDL	42.78 (8.28)	46.18 (11)	-3.40 (7.03)	31	0.010

All patients were being managed for emotional distress either by psychotherapy, psychiatric medications or both. Patients on psychiatric medications with or without psychotherapy were 98.4% (61) while those on psychotherapy with or without psychiatric medications were 82% (50). More than 80% (49) of patients were on both therapies. As shown in Fig. 3, about 77% (47) of patients were on one of SSRIs. Escitalopram was

being taken by 36.1% (22) of the patients while citalopram and fluoxetine were taken by 21.3% (13) and 14.8% (9) respectively. Patients on other antidepressants including TCA and SSNRI were 37.7% (23) while patients on antipsychotics were 4.9% (3).

A comparison of the metabolic parameters before and after management of emotional distress, showed a significant reduction in HbA1c ($p = 0.020$) and a

significant elevation of HDL ($p = 0.010$). The mean HbA1c before management was 8.7%, which decreased after management to 7.8%. Furthermore, the mean HDL cholesterol of 42.8 mg/dL increased to 46.2 mg/dL after management. However, no significant change was found when comparisons of BMI, BP, FBS, TC, TG and LDL were done (Table 2).

4. Discussion and Conclusion

4.1 Discussion

This study investigated whether the management of emotional distress would improve metabolic control in patients with type 1 and type 2 diabetes.

In our study, we observed that treating emotional distress, mainly depression and anxiety, in individuals with diabetes mellitus was associated with significant improvement in glycosylated hemoglobin A1c (HbA1c), and high-density lipoprotein (HDL) cholesterol. In some of the previous studies, significant decreases in HbA1c were demonstrated [17, 18], as illustrated by our results. However, in other studies, HbA1c remained unchanged despite antidepressant therapy [16, 19, 20]; in another study, there was transient improvement in HbA1c [21]. These controversies might suggest that treating emotional distress may be necessary, but not adequate to improve glycemic control in patients with diabetes. The variations in these results could be due to the brevity of the studies' period, which hindered the full effects of antidepressants to be manifest, sample size, the use of different medications, and different diagnostic criteria for the mental illnesses.

However, we did not find any significant change with regard to other metabolic parameters, including total cholesterol, triglyceride and low-density lipoprotein cholesterol. In addition, no significant change was found in body mass index, blood pressure and fasting blood glucose.

Another point to be considered is the antidepressant chosen for treatment. Some groups of these drugs such as monoamine oxidase inhibitors and tricyclic antidepressants have been known to be associated

with weight gain and deterioration in glycemic control [22], while selective serotonin reuptake inhibitors (SSRIs), such as citalopram, have been found to be effective in improving glycemic control [17, 18, 21, 23]. However, in our study, although there was an overall improvement in HbA1c and HDL cholesterol, we could not test the correlation between specific antidepressants and the metabolic outcome since the study was observational.

The major limitation of our study was the relatively small study population. This could have affected the statistical ability to show a significant change in metabolic parameters other than HbA1c and HDL. However, the improvement in HbA1c in our study was similar to that found in the literature where there was significant improvement in HbA1c after treatment with SSRIs [17, 18]. Another limitation, which affected the status of improvement, was the subjective measurement of improvement by the treating physician and patient's self-reported improvement rather than the use of a validated tool, which could give more accurate results. Finally, although several studies found a relation between emotional distress and metabolic control, more RCTs need to be done to prove this relation and to specify the effective management modalities.

4.2 Conclusion

Emotional distress has been widely demonstrated to adversely affect patients with diabetes. This study's main objective was to test the effect of the management of emotional distress on metabolic control of diabetic patients attending PMCC.

The study found that relief of emotional distress in diabetics could result in an improvement in HbA1c and HDL cholesterol, both of which are important targets in the management of diabetes. However, we could not demonstrate any significant improvement in other metabolic parameters including BMI, TC, TG, LDL, and FBS.

This finding suggests that treating emotional

distress in diabetics is necessary, not only for emotional well being, but also metabolic control.

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Conflicts of Interest

This research did not receive any specific funding and the authors declare no conflicts of interest.

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