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Adherence in Patients with Type 2 Diabetes and Depression and the Role of Physician-Patient Relationship: A Cross-Sectional Study

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Abstract

Background: Diabetes mellitus (DM) challenges health and quality of life of patients, families, and communities. Patients with comorbid depression are more likely to develop macrovascular and microvascular complications. The aim was to assess glycemic control and adherence in diabetic patients with comorbid depression. Further, the study evaluated the relationship between adherence and the physician-patient relationship. **Methods:** The study was conducted at Al-Agouza Family Medicine Center (AFMC) between February 2018 and March 2020. The included patients were between 35 - 80 years of age; had type 2 diabetes with hemoglobin A1c (HbA1c) ≥ 6.5%, fasting plasma glucose ≥ 126 mg/dl, and scored between 11 - 30 on the Beck Depression Inventory (BDI). Logistic regression, chi-square, and analysis of variance (ANOVA) were used to assess the relationship between depression, adherence, physician-patient relationship, and other variables. **Results:** The study included 100 eligible patients with a median BDI score of 20 (10 - 30). The median diabetic panel for patients was FBS 188 (126 - 348) mg/dl, PPS 282.50 (162 - 448) mg/dl, and HbA1c 9.5 (6.6 - 14.0)%. Depression and regular follow-up visits were statistically associated with improvement of diabetes symptoms ($p = 0.019$). There was a significant relationship ($p < 0.001$) between adherence, regular follow-up visits, and knowledge of DM. Further, there was a significant relationship between the physician-patient relationship and DM improvement ($p = 0.047$). **Conclusion:** Physician-patient relationship was paramount to improving adherence and positive diabetes care. Our findings suggest a shift to a physician-patient relationship model with mutual agreement on medical decisions is highly recommended.

Keywords

Depression, Type 2 Diabetes, Adherence, Physician-Patient Relationship

1. Background/Rationale & Objectives

DM challenges health and quality of life of patients, families, and communities. Type 2 diabetes (T2D) is the most common form of diabetes, affecting more than 95% of diabetics globally [1]. Currently, around 537 million, or 1 in 10 adults aged between 20 and 79 years are living with diabetes. The diabetic threat to global health is rapidly escalating with numbers expected to increase to 643 million and 783 million by 2030 and 2045 respectively. In low to middle-income countries, the ratio of diabetic patients is even higher (3 in 4). Further, diabetes mortality is on the rise. In 2021, it was the direct cause of 6.7 million deaths before the age of 70 worldwide estimated at 1 death every 5 seconds [2].

Over time diabetes can have a detrimental effect on the heart, blood vessels, eyes, kidneys, and nerves. T2D patients are susceptible to short- and long-term complications. Adults with diabetes have a two- to three-fold increased risk of heart attacks and strokes compared to their healthy counterparts. The reduced blood flow and neuropathy increase the chance of developing diabetic foot and eventual limb amputation. Diabetic retinopathy is attributed to 2.6% of global blindness and diabetic nephropathy is among the leading causes of kidney failure [3] [4].

Compared to patients with diabetes alone, patients with comorbid depression are more likely to develop macrovascular and microvascular complications. Further, comorbid depression is associated with higher mortality rates [5] [6]. The relation between diabetes and depression is bidirectional. Depression is associated with poor diabetes control as a result of low medication adherence, self-care, and adverse mental status. Conversely, depression can develop as a result of endocrine and neurological abnormalities caused by diabetes and its associated complications [6] [7].

The care of diabetes involves adopting a healthy diet and lifestyle and routine self-care. Adherence is key to favorable clinical outcomes and has been associated with reduced hospital admissions, morbidity, and mortality [8]. According to the WHO report, the average adherence to long-term therapy in developed countries is approximately 50% with lower rates reported for adherence to lifestyle instructions. This percentage is even lower in developing countries [4]. Between one-third and two-thirds of all medication-related hospitalizations and half of nursing home admissions in the United States are due to poor medication adherence [9]. In addition, the direct costs of complications attributable to poor control of diabetes are 3 - 4 times higher than those of control [4]. Improving adherence would yield substantial health and economic benefits. Balkrishan *et al.* observed that for each 10% increase in adherence among diabetic patients, there

has been an 8.6% - 28.9% decrease in total annual healthcare costs [10].

Moreover, improving physician-patient communication has been linked to greater adherence, better health outcomes, and quality of life [11] [12]. These days the physician-patient relationship is often superficial and centered on disease management and health institutions' interests. As a result, the management plan is based on unilateral decisions and the provider's experience. Poor communication is a barrier to effective diabetes treatment. Comprehensive action should be adopted that focuses on the patients and their diseases alike [13].

Non-adherence challenges patients and healthcare systems. Traditionally, non-adherence has been attributed to a patient's failure or refusal to comply with prescribed medications due to a lack of knowledge or motivation. However, a new perspective has emerged that adopts a more collaborative approach between patient and provider that focuses on concordance rather than adherence. This perspective recognizes a broader set of factors and provides a better understanding of the problem [14]. This study aimed to assess glycemic control and adherence among diabetic patients with comorbid depression. Further, the study evaluated the relationship between adherence and the physician-patient relationship and explored possible reasons for poor adherence.

2. Methods

2.1. Study Design, Settings, & Participants

This cross-sectional study was conducted at Al-Agouza Family Medicine Center (AFMC) between February 2018 and March 2020. The AFMC is a primary health care center located in Giza, Egypt. Over 1370 family medical records are currently stored in the AFMC patient registry (database) which has been maintained since 2011. The study was reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline [15].

Eligible patients were between 35 and 80 years of age; ambulatory; able to give informed consent; and able to obtain reliable information. Patients were included if they met the American Diabetes Association criteria for T2D (HbA1c ≥6.5%, fasting plasma glucose (FPG) ≥126 mg/dL) with diagnosis confirmed by the participants' medical clinician [16] and if they scored 11 - 30 on the BDI scale (Mild mood disturbance to Moderate depression) [17].

Participants were excluded if they had type I diabetes and psychiatric disorders other than depression or personality disorders including schizophrenia, bipolar disorder, and substance or alcohol abuse. Depressed patients on treatment for depression were not included. Suicidal patients and those diagnosed with major depressive disorder were referred to a psychiatrist.

The study was part of a trial registered on clinicaltrials.gov (NCT04214600) [18]. The Elkaser Eleni medical school, Cairo University research ethics committee approved this trial (D-49-2019). It was conducted in accordance with the Declaration of Helsinki Ethical Guidelines for medical research involving human subjects.

2.2. Sample Size Calculation

It was estimated that 11% of patients in the database AFMC had T2D. A sample size of 80 participants was calculated based on a sample with a power of 80% and a 5% significance level. The sample size was estimated by assuming the maximum variability criterion, with a confidence level of 95% and a precision of 4% [19]. We recruited 100 participants to allow for an expected dropout rate of 15% - 20%.

2.3. Data Sources & Measurements

A structured questionnaire was used to collect data from the study participants. The questionnaire was translated into the layman's Arabic language. It was tested on ten patients for one month to check for clarity of the questions and responses. Accordingly, the questionnaire was modified to improve patients' comprehension. It included:

1) Sociodemographic: age, gender, marital status, education level, and occupation.

2) Diabetes History: age of onset and duration of diabetes, comorbidities, diabetes side effects, and family history; and type of diabetes medications (insulin or oral hypoglycemic drugs).

3) Diabetes Self-Management Questionnaire (DSMQ): was used to assess glycemic control, self-care activities, and the physician-patient relationship [20]. Responses to the questions were adjusted based on the pilot testing to "always, often, sometimes, and never."

4) Depression Assessment Using BDI [17]: BDI is a 21-question multiple-choice self-report inventory, used for measuring depression's severity. A value of 0 to 3 was assigned for each answer and then the total score was compared to a key to determine the depression's severity. The standard cut-off scores were as follows: 1 - 10 Normal; 11 - 16 Mild mood disturbance; 17 - 20 Borderline clinical depression; 21 - 30 Moderate depression; 31 - 40 Severe depression; over 40 Extreme depression. Further, we used the (SCID-5) [21] to diagnose patients with mood disorders and exclude other psychiatric morbidities.

5) Measure Treatment Adherence (MTA): modified scale was used to assess diabetes adherence [22] [23]. Several studies have validated the scale [24] [25]. The MTA Scale consisted of six questions and allowed answers from "always" to "never", with scores ranging from 1 to 4 points. The highest values indicated the highest treatment adherence level. Adherence scores were considered as follows: more than 75%-good adherence; between 50% - 75%-poor/partial adherence; and less than 50%-non-adherence.

Further, six questions were added to the questionnaire to further explore: 1) Adherence; "How often do you go to diabetes-related doctors' appointments?" a) Twice a month; b) Every month; c) Every two months; d) A few times a year); "How often do you test your blood glucose?" (a) Every day; b) Every week; c) Twice a month; d) Every month; e) Every two months; and f) A few times a year); and "where?" (Home/health facility); 2) Possible reasons for non-adherence

and responses were: a) Treatment is ineffective; b) Medication side effects; c) Treatment is expensive; d) Forgetfulness; e) Others); and 3) Physician-patient relationship: "Does the doctor talk to you and ease your complaints?" a) Always; b) Sometimes; d) Never); and 4) "How would you rate your understanding of diabetes?" (Good or Poor).

The anthropometric measurements of weight in kilograms (kg) and height in centimeters (cm) were conducted using the UGM-200 health scale while participants were wearing light clothes, with bare feet, and looking at the horizon. The waist circumference (WC) in centimeters was measured on bare skin, mid-distance between the bottom of the rib cage and the top of the iliac crest using a measuring tape. The body mass index (BMI) was calculated by dividing the weight by the height squared (BMI = weight in kg/height squared in cm) [26].

Laboratory investigations included FPG, 2-hour post glucose (2-hPG), and HbA1c to assess diabetes control. Participants arrived at the study center following an overnight fast (≥7.5 hours) and were instructed to take their antihypertensive medications as prescribed. FPG and 2-hPG were drawn from the antecubital vein and further processed.

2.4. Statistical Methods

Data were analyzed using the Statistical Package for Social Science Version 21 (SPSS-V 21). The normal distribution of the data was examined by the Shapiro-Wilk test [27] [28] and parametric tests. Results of $p > 0.05$ were considered insignificant, indicating a normal distribution. A parametric Levene's test was used to verify the equality of variances in the samples (homogeneity of variance) ($p > 0.05$) [29] [30].

Descriptive statistics were computed as medians and interquartile ranges (IQR) for continuous variables and percentages for qualitative variables. Logistic regression was conducted to examine the association between depression, regular follow-up, and improvement in diabetes symptoms. We used the chi-square test to determine the relationship between 1) adherence to medications and 2) physician-patient relationship as outcome variables and the independent variables regular follow-up visits, improvement of DM, knowledge about the disease and management, and adherence to diabetes self-care.

Moreover, a one-way Analysis of Variance (ANOVA) was performed to assess the effect of adherence on HbA1c, BMI, and WC. Log-10 was used to normalize HbA1c, BMI, and WC. P-values were reported to three decimal places with p-values less than 0.001 reported as $p < 0.001$. We used 2-sided p-values with alpha ≤ 0.05 significance level.

3. Results

3.1. Sociodemographic, Anthropometric Measurements & Clinical Investigations

Figure 1 shows the flow diagram of the study participants. Of the 349 diabetic

patients we contacted, 100 met our inclusion criteria and were included in the study. Around 69% of the patients were females; three-fourths (74%) were between 45 - 54 years of age. The majority were married 62% and illiterate 42%. More than half of the patients (60%) were unemployed; around half (48%) were housewives as shown in Table 1. The median WC and BMI were 107 (81 - 143) cm and 33.63 (21.11 - 51.26) kg/cm^2, respectively. Results of the diabetic panel were FBS 188 (126 - 348) mg/dl, PPS 282.50 (162 - 448) mg/dl, and HbA1c 9.5 (6.6 - 14.0)%.

Table 1. Sociodemographic characteristics of study participants, n = 100.

Demographics	Sub-groups	Percent
Gender	Male	31
	Female	69
Age	35 - 44	17
	45 - 54	37
	55 - 64	17
	>=65	29
Marital status	single	2
	married	62
	divorced	12
	widowed	24
Education level	illiterate	42
	read/write	11
	primary	9
	preparatory	8
	secondary	5
	university	25
Job status	full time	28
	part time	4
	per diem	8
	unemployed	7
	retired	5
	housewife	48
Job type	no job	23
	unskilled	3
	Skilled (Manual)	5
	managerial	1
	Professional	8

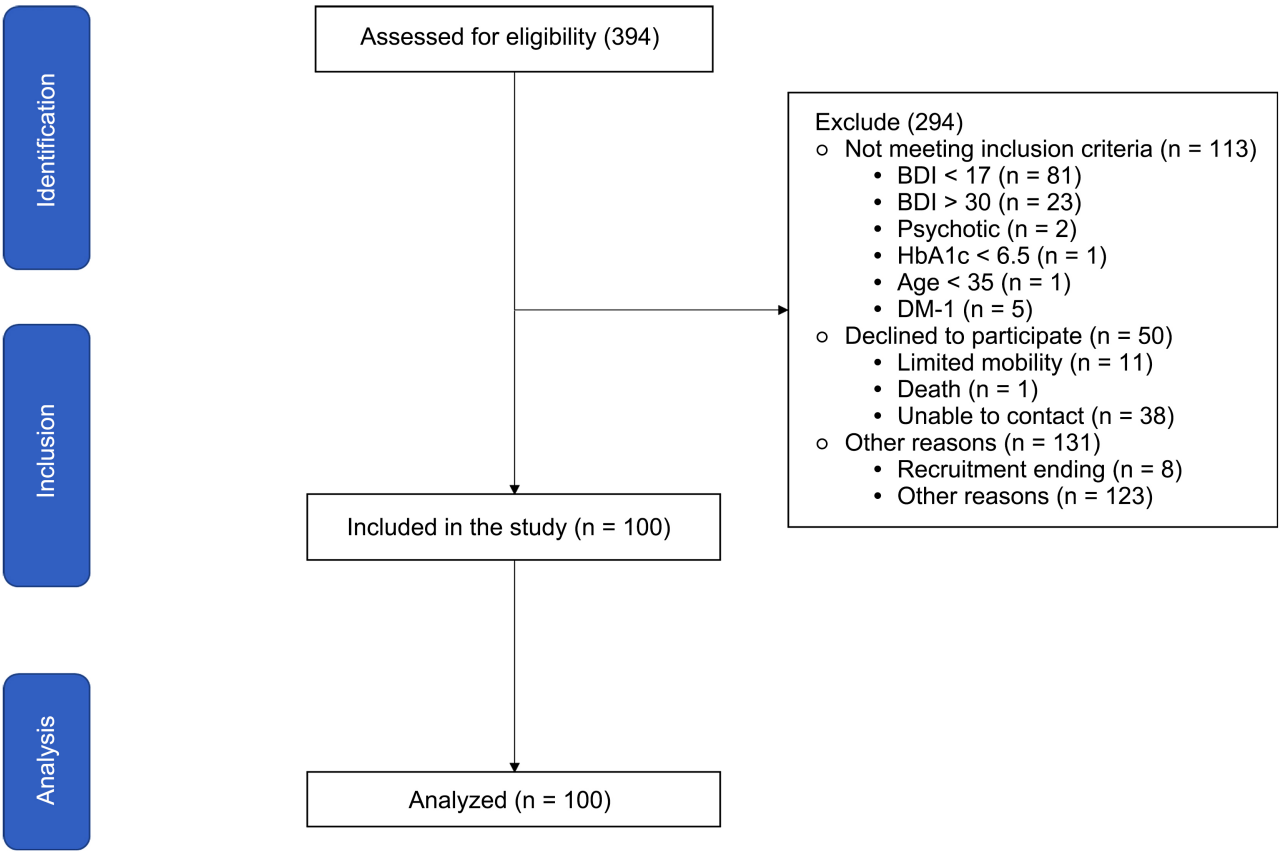

Figure 1. STROBE flow diagram and sample characteristics.

3.2. Diabetes History & Diabetes Management

The median (IQR) age for developing diabetes was 45 (30 to 69) years, and the duration of the disease was 10 (1 to 30) years. Most patients (41%) had at least one comorbidity. The most reported comorbidity was hypertension (53%). The majority had one to two side effects (31% & 33% respectively) which were tingling and numbness (81%), followed by retinopathy (45%). Around three-fourths of the sample (73%) had a positive family history of diabetes.

The majority of patients used oral hypoglycemics (69%) and showed inconsistent testing of blood glucose (65%) in a health facility (81%) and frequent follow-up visits every other month or less (68%). Diabetes self-care showed variable results in which 36% of the patients reported excellent vs. 37% reported poor diabetes self-care. More than half (66%) of patients did not have knowledge of diabetes or its management.

3.3. Depression in Diabetic Patients

The median (IQR) for the BDI score was 20 (10 - 30). According to the scale, 49% of the participants had moderate depression, 33% had anxiety and mood disturbances, and only 18% had mild depression. Logistic regression was used to examine the effect of depression and regular follow-up visits on diabetes symptom improvement likelihood.

A preliminary analysis indicated that the assumption of multicollinearity was met (tolerance 0.995). Inspection of the standardized residual value revealed three outliers that were kept in the dataset. The logistic regression model was statistically significant [χ^2 (2, N = 100) = 7.97, p = 0.019)], suggesting that it could distinguish between no/improvement in diabetes symptoms. The model explained between 7.7% (Cox & Snell R square) and 11.6% (Nagelkerke R square) of the variance in the dependent variable and correctly classified 77% of cases. Depression severity (not follow-up visits frequency) significantly contributed to the model. The depression severity odd ratio suggested that for every increase in depression score, there were 1.092 times less likely improvements in diabetes symptoms.

3.4. Adherence

Around three-quarters of patients reported good medication adherence (73%). The median (IQR) for MTA score for adherence was 95.83% (25% to 100%) (9% were none compliant, 18% were poorly compliant, and 73% were compliant). The most reported reasons for non-adherence were cost and forgetfulness, both at 29%. Further, 77% felt better about medications, and more than half (65%) cited monetary burdens related to the disease.

A Chi-Square Test of Independence was performed to assess the relationship between adherence and regular follow-up visits, improvement in DM, knowledge about the disease, and self-care (**Table 2**). Adherent patients had good knowledge about DM (44%) and experienced an improvement in diabetes symptoms compared to non-adherent patients (62%). However, only 31% of adherent patients reported regular follow-up visits and the majority reported poor self-care (36%). There was a significant relationship between adherence and regular follow-up [χ^2 (1, N = 100 = 13.609, p < 0.001]; DM improvement [χ^2 (1, N = 100) = 9.604, p = 0.002]; and knowledge of DM [χ^2 (1, N = 100) = 3.950, p = 0.047]; and self-care [χ^2 (3, N = 100) = 20.963], p < 0.001]. There was no significant statistical relation between sociodemographic variables and MTA score or with adherence to medications, diet, and exercise using the chi-square test.

A one-way ANOVA was performed to compare the adherence effect on HbA1c, BMI, and WC. Analysis revealed that there was not a statistically significant difference in HbA1c between at least two groups [F (between groups 1, within groups 98) = 0.237, p = 0.627]. However, there was a statistically significant difference in BMI and WC between at least two groups [F (between groups 1, within groups 98) = −4.985], p = 0.028] & [F = 4.358], p = 0.039] respectively).

3.5. Physician-Patient Relationship

More than three-fourths of the patients (79%) reported poor physician-patient relationships despite more than half reported receiving dietary (58%) & lifestyle (including exercise) (54%) counseling. Around half of the patients did not eat healthy food (52%) or exercise regularly (46%) to control diabetes.

Table 2. Analysis for adherence to medications & physician-patient relationship.

Variables	Adherence to medications		P-value	Variables	Doctor-patient relationship			P-value
	Yes	No			Always	Sometimes	Never	
Regular follow-up visits				**Regular follow-up visits**				
Always	31	1	<0.001	Always	8	1	23	0.339
Never	42	26		Never	9	3	56	
DM outcome				**DM outcome**				
Improved	62	15	0.002	Improved	17	3	57	0.047
Not improved	11	12		Not improved	0	1	22	
Knowledge	Yes	No		**Knowledge**				
Good	44	22	0.047	Good	7	2	57	0.040
Poor	29	5		Poor	10	2	22	
Self-care	Yes	No		**Self-care**				
Always	18	18	<0.001	Always	7	1	28	0.849
Often	6	2		Often	1	1	6	
Sometimes	13	6		Sometimes	2	1	16	
Never	36	1		Never	7	1	29	

Further, we tested the relationship between the physician-patient relationship and regular follow-up visits, DM improvement, knowledge about the disease, and self-care (Table 2). Patients with a poor physician-patient relationship were less likely to have regular follow-up visits (56%). However, 57% of patients reported improvement in diabetes and better knowledge of the disease and its management. There was a significant relationship between the physician-patient relationship and DM improvement [χ^2 (2, N = 100) = 6.135, p = 0.047]; and knowledge [χ^2 (2, N = 100) = 6.457, p = 0.040]. However, there was an insignificant relation between the physician-patient relationship and regular follow-up visits [χ^2 (2, N = 100) = 2.164, p = 0.339] and self-care [χ^2 (6, N = 100) = 2.671, p = 0.849]. Moreover, there was an insignificant statistical relation between the physician-patient relationship and adherence to medications, diet, and exercise with the chi-square test.

4. Discussion

4.1. Characteristics of Depressed & Diabetic Patients

The study was part of an RCT conducted in a primary healthcare facility in Elgiza, Egypt (NCT04214600). It included 100 diabetic patients. The majority of pa-

tients in the study were females. Since they were housewives, they had flexible schedules. In addition, females tend to seek primary healthcare services more than men. Similarly, earlier studies suggested higher depression prevalence and scores among females with T2D than males [31] [32] [33] [34]. The high prevalence of depression in women might be attributed to the change in socio-cultural roles women play nowadays. In addition to the hormonal changes, they experience which make them more susceptible to stress and psychiatric disorders.

Regarding education levels, about 42% were illiterate, and 11% could read and write. CAPMAS 2017 reported illiteracy rates in Egypt at 25.2%, which was lower than the study results [35]. Further, around half of the patients were unemployed. This percentage was lower than the EDHS 2014 reported rate of unemployment among females (86.4%) [36]. Low education attainment increases unemployment, leading to low socioeconomic status and stressful life events. This renders people more vulnerable to psychological stress with diabetes, depression, and other chronic diseases.

The age range of diabetic patients was between 45 - 54 years similar to other studies [31] [37]. The median (IQR) age for developing diabetes was 45 (30 to 69) years and the duration of the disease was 10 (1 to 30) years. T2D prevalence increases with age, although it can occur at any age. Nowadays, people develop diabetes at younger ages than before. Moreover, there is a shift in diabetes diagnosis age from 52.0 to 46.0 years [38]. DM duration is a major predictor of depression. When the duration is long, more patients develop depression [39].

Understanding diabetic sociodemographic characteristics is paramount for healthcare planning, research, and other public health efforts. Knowing the age distribution, gender, educational attainment, and employment patterns of diabetic patients helps in designing culturally relevant public health programs that are appropriate and accessible to various sociodemographic groups and economic levels. Identifying employment patterns of population subgroups may help improve education systems and vocational training.

The majority of patients had at least one comorbidity. The most common comorbidity was hypertension. Around one-third of the patients experienced one or two T2D side effects. The most commonly experienced side effect was tingling/numbness (peripheral neuropathy) (82%). In a meta-analysis by Engum *et al.*, there was a positive association between depression and diabetes complications, both macrovascular and microvascular [40]. Another review showed that, over a five-year period, patients with major depression and DM had a 36% higher risk of developing advanced microvascular complications such as nephropathy or blindness. In addition, they had a 25% higher risk of developing advanced macrovascular complications, such as myocardial infarction and stroke [41].

Obesity poses a major health challenge because it substantially increases chronic disease risks. In developing countries, overweight and obesity are on the rise. Clinical evidence indicates a stronger association of diabetes with central

obesity than with general obesity. WC is the most reliable method for measuring both intra-abdominal fat mass and total fat in the abdomen. High WC measurements have been strongly associated with morbidity and mortality [42] [43]. Our results showed the median WC was 107 (81 - 143) cm and BMI was 33.63 (21.11 - 51.26) kg/cm^2. Based on the STEP Survey 2018, Egyptians between 15 and 69 years old had an average BMI of 28.2 ± 0.30 kg/m^2 [44].

Diabetes and depression occur together approximately twice as frequently as would be predicted by chance. Comorbid depression and diabetes were associated with poor glycemic control and increased complications. The study participants showed poor glycemic control with a median FPG of 188 mg/dl; 2 h PG 282.50 mg/dl; and HbA1c of 9.5%. Similarly, other studies reported HbA1c levels above 8% and even higher levels among those with depression [45] [46] [47]. The median BDI score was 20 indicating around half of the participants had moderate depression. Our results suggest that patients with high BDI scores were less likely to show improvement in diabetes.

4.2. Adherence & Physician-Patient Relationship

Medication adherence is key to controlling DM. According to several studies, patients with diabetes and depression have a low level of adherence to medications [48] [49]. The median MTA score in this study was 95.83% indicating good adherence. The self-reported adherence by the patients was in concordance with the MTA scale results which were similar to those of Gonzalez *et al.* [50]. Further, our results showed that adherent patients were more knowledgeable about DM and reported improvement in diabetes symptoms compared to their non-adherent counterparts. Adherence was significantly related to regular follow-up visits; DM improvement; knowledge; self-care, BMI, and WC. However, it was insignificantly related to HbA1c. This high adherence rate might be due to the fact that diabetes care, including follow-up visits and medication dispensing, was free of charge in the health facility where the study was conducted.

Guidelines on the management of non-communicable diseases recommend diabetes patients see their primary healthcare physician at least once every four months. Further, patients with uncontrolled diabetes should have more frequent visits. The majority of participants reported regular follow-up visits every two months or less. The study was conducted in an urban center. It is well known that urban health facilities tend to be better equipped and accessible than rural facilities.

Family medical centers should strengthen programs focusing on encouraging regular primary health care (PHC) services. That could be achieved by encouraging regular phone calls or electronic follow-up reminder systems or home visits to improve patient outcomes. Such approaches would promote trust between the healthcare teams and patients, diminish anxiety, and improve patients' willingness to visit primary health facilities. Moreover, financial incentives, whether in the form of allowances or per diem payments could be provided for health-

care personnel involved in ensuring the implementation of the system.

The main factor that could be a potential predictor of adherence was the physician-patient relationship. Lack of adherence occurs frequently in depressed and diabetic patients alike. Motivating patients to achieve high adherence is challenging [51]. The majority of patients reported poor physician-patient relationships. Around half of the patients did not have good control over their diet or adopt an active lifestyle. Patients who had a poor physician-patient relationship were less likely to have regular follow-up visits. There was a significant relationship between the physician-patient relationship and DM improvement and knowledge. However, there was an insignificant relationship between the physician-patient relationship and regular follow-up visits; self-care; and adherence to medications, diet, and exercise.

Patient participation concepts emphasize real partnerships between patients and physicians. The interaction between patients and healthcare professionals should not be limited to reinforcing treatment instructions. Instead, it should be in a way where both parties can pool their expertise to achieve mutually agreed goals. Evidence suggests that involving patients more in consultations can increase treatment adherence [52] [53].

Patients and physicians have different perspectives and interpretations of diseases. The physician's motivation to achieve optimal medical results may conflict with the patient's motivation to lead his own life. A closer relationship where patients are more engaged with their physicians could reduce frustration. Physicians should have the skills to explore patients' expectations and translate them into realistic objectives that fulfill patients' perspectives. In fact, patients should be the primary actors in medical decision-making, and healthcare providers should adopt a supportive role.

The study was conducted in a single urban PHC facility. The reported results reflect a small segment of the diabetic population, which hinders the external validity of the study. Further, due to the small sample size, the chi-square assumption was violated (no more than 20% of the expected cells with >5) for some variables including physician-patient relationship and doctor visits, DM improvement, knowledge, and self-care. Further, data were transformed to the normal distribution to conduct one-way ANOVA, for variables HbA1c, BMI, and waist circumference using Log10.

5. Conclusion

Our findings suggest a shift to a physician-patient relationship model with mutual agreement on medical decisions. This joint physician-patient interaction could contribute to more positive diabetes care. As a result, patients will be able to set their own goals, which will enhance physicians' consultation depth and value. In this regard, large-scale studies are recommended to extend the findings to other rural and urban settings further and include a larger segment of patients.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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