Adherence to therapy among Iraqi patients with type 2 Diabetes Mellitus

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Abstract
Background :-adherence to therapy is defined as the extent to which a person's behavior in taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider. Patients presenting with type 2 diabetes mellitus are initially encouraged to maintain a healthy diet and exercise regimen, followed by early medication that generally includes one or more oral hypoglycemic agents and later may include an injectable treatment. To prevent the complications associated with type 2 diabetes, therapy frequently also includes medications for control of blood pressure, dyslipidemia and other disorders, since patients often have more than three or four chronic conditions.

Aim :-Despite the benefits of therapy, studies have
indicated that recommended glycemic goals are achieved by less than 50% of patients, which may be associated with decreased adherence to
therapies. Measure the adherence to therapy among Iraqi patients with type 2 diabetes mellitus.

Materials and amethods:-Various measures to increase patient satisfaction and increase adherence in type 2 diabetes have been investigated. These
include reducing the complexity of therapy by fixed-dose combination pills and less frequent dosing regimens, using medications that are associated with fewer adverse events (hypoglycemia or weight gain), educational initiatives with improved patient–healthcare provider communication, reminder systems and social support to help reduce costs.

Results :-As a result, hyperglycemia and long term complications increase morbidity and premature mortality, and lead to increased costs to health services. Reasons for no adherence are multifactorial and difficult to identify. They include age, information, perception and duration of disease, complexity of dosing regimen, poly therapy, psychological factors, safety, tolerability and cost.

Conclusions:-It is evident from many studies that type 2 diabetes is a progressive disease pharmacologic treatment is essential to maintain glycemic control and reduce adverse cardiovascular outcomes. Even though adherence to medications leads to beneficial outcomes, it was found to be suboptimal. High cost of medications was significantly associated with poor antidiabetic drug adherence, other reasons for poor adherence including age, social and psychological factors, education and a lack of understanding of the long-term benefits of treatment, the complexity of the medication regimen, cost of medication and negative treatment perceptions. Poor communication between doctor and patient, adverse outcomes such as weight gain and hypoglycemia, and failure of clinicians to modify medications appropriately can also affect adherence.
Keywords:- diabetic , adherence , medications , adverse effect , cost

Introduction

Diabetes mellitus is the term used to represent a clinically and genetically heterogeneous group of disorders characterized by abnormally high blood glucose levels (hyperglycemia) as a result of either insulin deficiency or cellular resistance to the action of insulin (1).

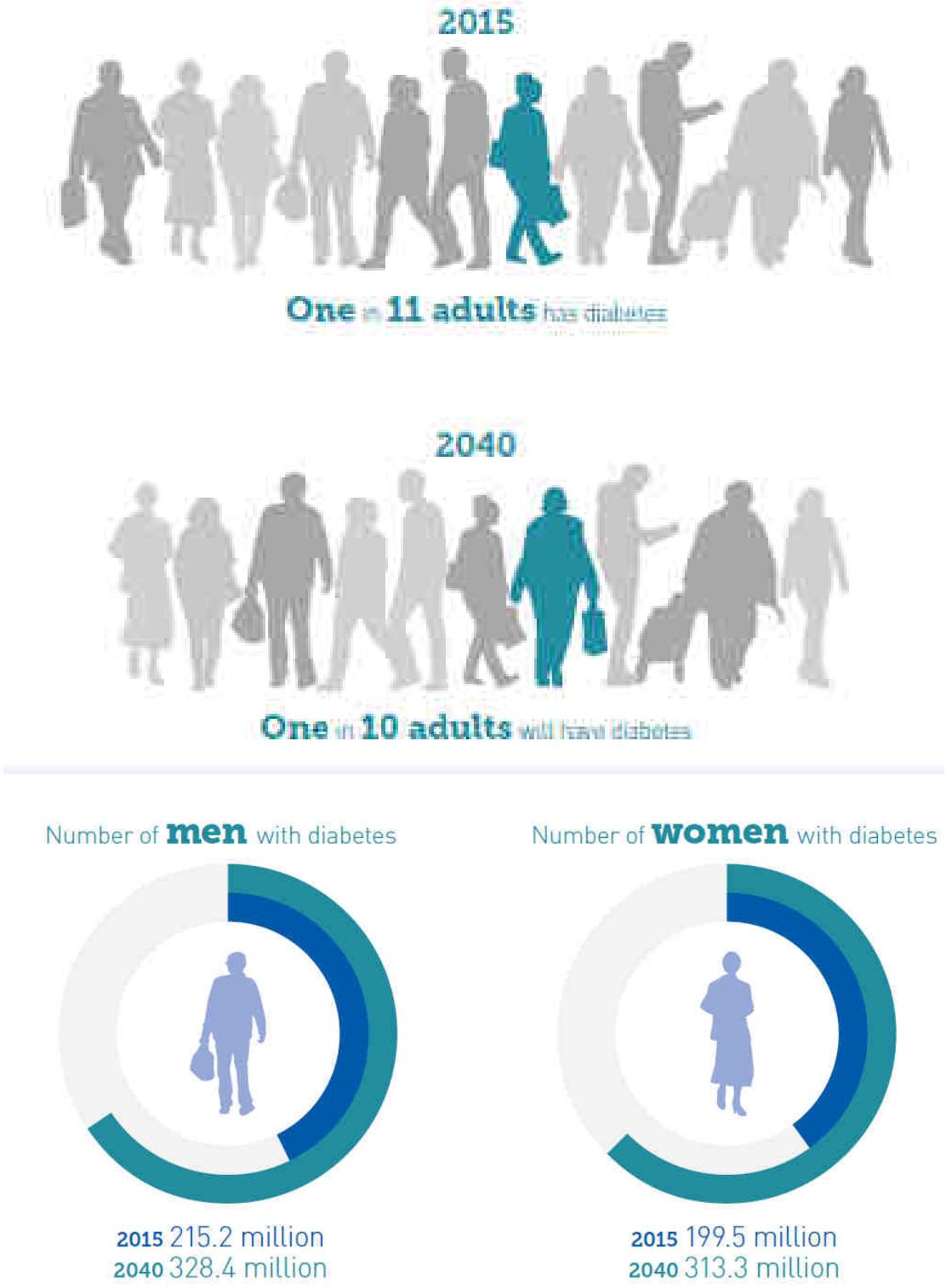


Figure 1 prevalence of diabetes 2015(2).

Type1 diabetes, previously called insulin-dependent diabetes
mellitus (IDDM), accounts for 5 to 10% of all diagnosed cases of diabetes (3).Type1 diabetes, caused by failure of pancreatic beta-cells to produce insulin, can afflict both children and adults who will require daily injections of insulin. Inadequate use of insulin results in ketoacidosis and this inevitable consequence limits the extent to which patients can ignore recommendations to take exogenous insulin and still survive.

Type2 diabetes, previously called non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes, may account for about 90% of all diagnosed cases of the disease. It is typically associated with being overweight and is caused by insulin resistance. For patients with type 2 diabetes, weight control, by means of dietary and physical activity regimens, is the cornerstone of the treatment. However, pancreatic beta cell function decreases over time, so many patients will eventually require treatment with oral medications or exogenous insulin.

Gestational

diabetes develops in 2 to 5% of all pregnancies, but disappears postpartum (4). Risk factors include race/ethnicity and a family history of diabetes and obesity.

Other specific types of diabetes result from specific genetic syndromes, surgery, drugs, malnutrition, infections and other illness, and account for 1 to 2% of all diagnosed cases of diabetes.
Most patients with type 2 diabetes are older than age 30 (5).

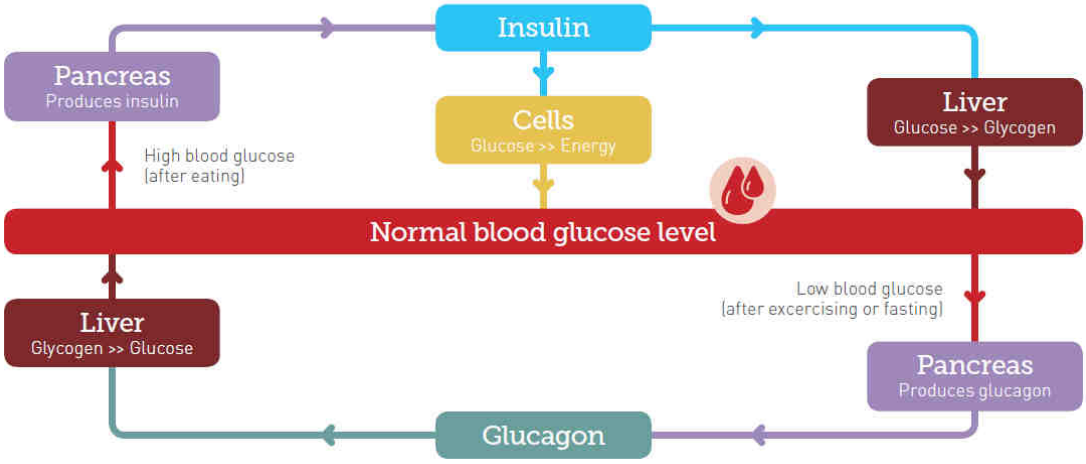


Figure 2 insulin production and action.(6)

Adherence mean Contemporary perspectives on diabetes care accord a central role to patient self-care, or self-management. Self-care implies that the patient actively monitors and responds to changing environmental and biological conditions by making adaptive adjustments in the different aspects of diabetes treatment in order to maintain adequate metabolic control and reduce the probability of complications (7). The goals of diabetes treatment are to keep blood glucose levels as near normal as possible while avoiding acute and chronic complications"(8). In type11 The benefit of exercise occurs regardless of the person's initial weight or subsequent weight loss. Evidence for the benefit of dietary changes alone, however, is limited. With some evidence for a diet high in green leafy vegetables (9). Lifestyle interventions are more effective than metformin. While low vitamin D levels are associated with an increased risk of diabetes, correcting the levels by supplementing vitamin D3 does not improve that risk (10).

Methods and Materials:

2.1.Patients:

This is a randomize prospective clinical study, it was conducted in AL-Diwaniya and AL-Najaf. This study started at December 2015, this approved medical ethical community at AL-Kufa University.

2.2.Method:

Sample of 50 case males and females in AL-Diwaniya and AL-Najaf cities were chosen randomly. They were interview according to specialized questioner…. height…weight…blood glucose level were measured.

2.3.Inclusion and exclusion criteria:
The whole sample size was 50 participants; the only excluded waspregnancy.

2.4. Materials:
The device that use in our research was Accu-Chek Glucose Monitor device. Accu-Chek Glucose Monitor for your routine blood sugar testing. A handy glucose monitoring device for at home or anywhere else. It is easy to use, fast in accessing and perfect for a pain-free test. The glucose monitor by Accu-Chek comes with test strips, Softclix lancing device and sterile lancets. To use the glucose monitor, use the lancet device that fires a sharp needle marginally through the epidermis of the finger in order to allow a small amount of blood, squeeze it onto the strip and then put the strip in the monitor. The accurate result and its easy usage makes Accu-Chek Glucose Monitor a smart and a must buy.

2.5.Statistical analysis:
Statistical analysis was performed using SPSS 16. An expert statistical advice was consulted for tests used. Data of quantitative variable were expressed as mean ± SEM. Difference in each variable thought treatment intervals in the same group were compared using paired sample of student test. In all test, $P<0.05$ was consider to be statistically significant unless another levels were stated. 15

3.Results:
3.1.Demographic disturb in health and patients with DM.
Table (1): The of Age, Weight, and Height among healthy and patients with DM

Demographic Data	**Health (mean ± SEM)**	**D.M**	**P. Value**
Age	58.44 ± 1.86	57.35 ± 1.7	N.S
Weight	82.2 ± 2.14	80.95 ± 1.67	N.S
Height	157.23 ± 1.33	156.12 ± 1.24	N.S

N.S: No Significant

Patients with D.M expressed in mean ± SEM (stander error mean). In table (2) above there were no significant between demographic patients with DM.

Prevalence of adherence to recommendations for diabetes treatment:
From the study of adherence to treatments for diabetes, it is apparently important to assess the level of adherence to each component of the treatment regimen independently (i.e. self-monitoring of blood glucose, administration of insulin or oral hypoglycemic agents, diet, physical activity, foot care and other self-care practices) instead of using a single measure to assess adherence to the overall treatment. This is because there appears to be little correlation between adherence to the separate self-care behaviors, suggesting that adherence is not a unidimensional construct. This finding has been reported for type 2 diabetes. The study included a total of 50 diabetic patients, with a median age of 52 years (34-71 years). Two-thirds(n=33) of studied patients were females. About half of the patients had primary education. Most of the patients (n=32) had diabetes for more than 5 years. The majority (n= 38) were either overweight or obese.

Glucose monitoring adherence:
In a study conducted to assess patterns of self-monitoring of blood glucose (n=34) of patients with type 2 diabetes reported are performing self-monitoring of blood glucose as frequently as recommended (i.e. once daily for type 2 diabetes treated pharmacologically) (11). While the remaining patients (16) are non performing self-monitoring of blood glucose. Similar findings were reported in a study conducted in India, in which only 60% of study participants reported performing glucose monitoring at home.

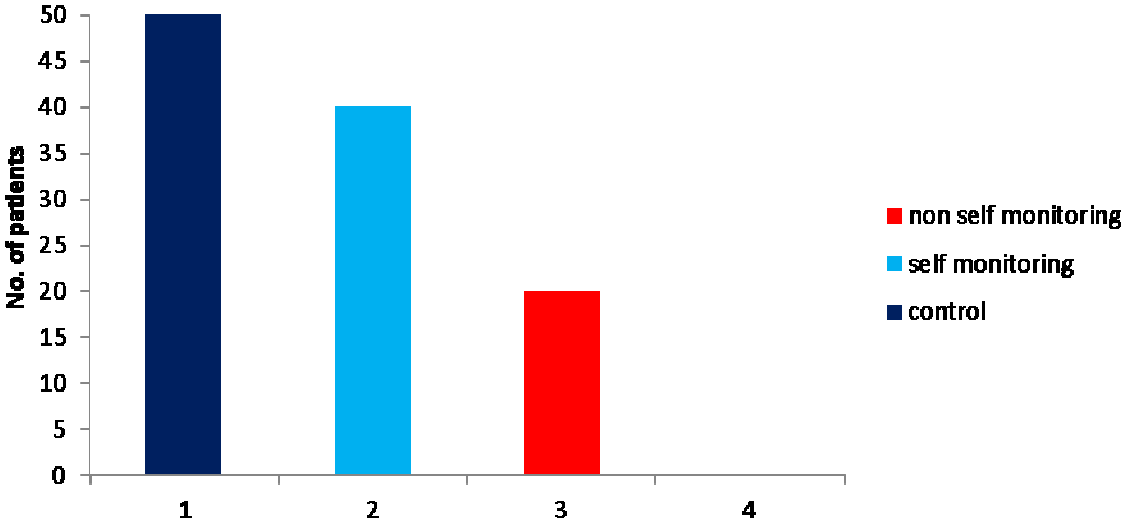
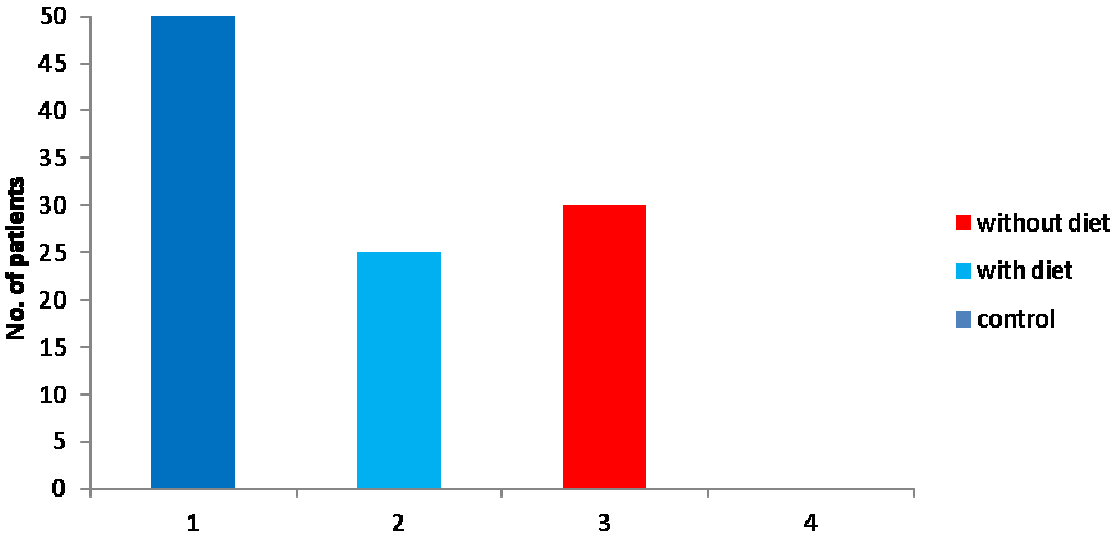


Figure (3) glucose monitoring adherence

Diet:

In this study dietary prescriptions were followed regularly by only 44% of patients (n=22). This Similar to adherence rates in a study conducted in India, dietary prescriptions were followed regularly by only 37% of patients, while in a study in the United States about half (52%) followed a meal plan (12) Anderson & Gustafson (13) reported good-to excellent adherence in 70% of patients who had been prescribed a high carbohydrate, high-fire diet .Wing et al. showed that patients with type 2 diabetes lost less weight than their non diabetic spouses and that the difference was mainly due to poor adherence to the prescribed diet by the diabetic patients. Adherence to dietary protocols may depend upon the nature of the treatment objective (e.g. Weight loss, reduction of dietary fat or increased fiber intake).



Figure(4) adherence to diet

Administration of medication:

Among patients receiving their medication from community pharmacies adherence to oral hypoglycemic agents was 78% (n=39). Dose omissions represented the most prevalent form of non adherence; however, more than one-third of the patients took more doses than prescribed.

This over-medication was observed more frequently in those patients prescribed a once daily dose. Similar adherence rates of between 70 and 80% were reported from the United States in a study of oral hypoglycemic agents in a sample of patients whose health insurance paid for prescribed drugs (14). .Gender, religion, level of education, duration of diabetes and number of oral hypoglycemic agents did not significantly affect adherence to antidiabetic medications. the increase in the number of drugs other than antidiabetics significantly increased anti-diabetic medication adherence. Peripheral vascular disease and peripheral neuropathy were the complications analyzed against anti-diabetic medication adherence. They were found to have no significant association with medications adherence. Hypertension, a common comorbid condition in patients with type 2diabetes mellitus was significantly associated with good anti-diabetic medications adherence. Patients with poor adherence reported several reasons for them not adhering to anti-diabetic medications. High cost of antidiabetic drugs, disappearance of symptoms, drug side effects including fainting, fatigue, palpitations, nausea, vomiting and itching were the main reasons for non- adherence. Metformin was the most used drug, either as a single drug or in combination with glibenclamide, its use accounted for (72%)(n=36), Glibenclamide (as a single drug) was the second most commonly used drug. (36%) were on single antidiabetic treatment, (62%) were on two antidiabetic drugs while (2%) were on three anti-diabetic drugs. None of the studied patients was on a combination of oral hypoglycemic agent and Insulin. The most commonly used drugs namely Metformin, Glibenclamide, glimepiride. Good anti-diabetic medication adherence was associated with better glycemic control using fasting/random blood glucose.

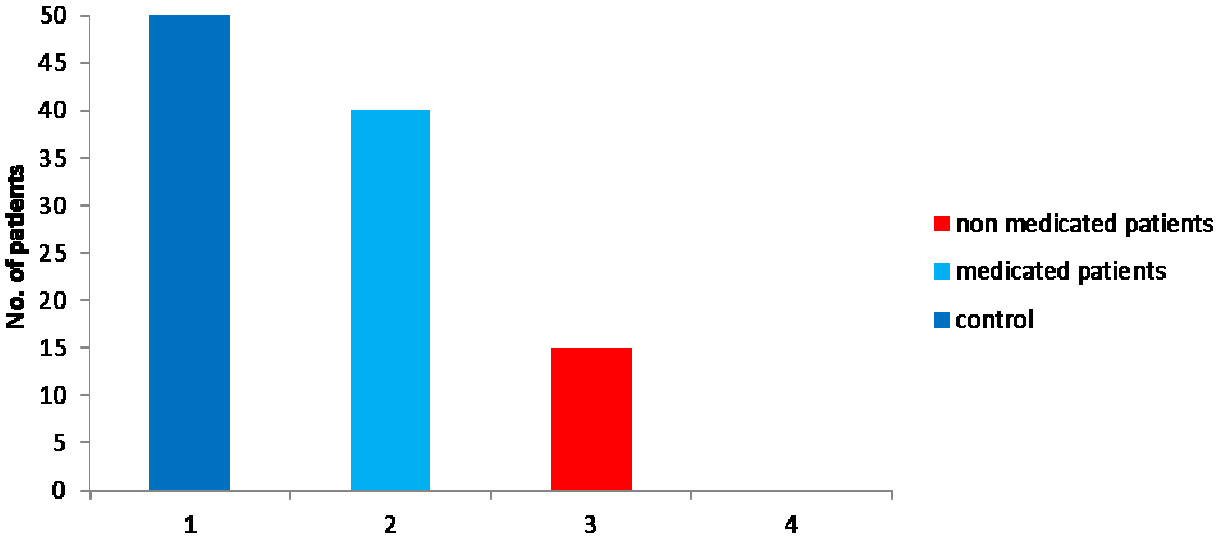


Figure (5) adherence to medicated

Discussion:

Diabetes mellitus type 2 is a long term metabolic disorder that is characterized by high blood sugar, insulin resistance, and relative lack of insulin. Common symptoms include increased thirst, frequent urination, and unexplained weight loss. Symptoms may also include increased hunger, feeling tired, and sores that do not heal(15). Often symptoms come on slowly. Long-term complications from high blood sugar include heart disease, strokes, diabetic retinopathy which can result in blindness, kidney failure, and poor blood flow in the limbs which may lead to amputations. The sudden onset of hyperosmolar hyperglycemic state may occur; however, ketoacidosis is uncommon. Adherence to therapy is defined as the extent to which a person's behavior in taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider. Patients presenting with type 2 diabetes mellitus are initially encouraged to maintain a healthy diet and exercise regimen, followed by early medication that generally includes one or more oral antidiabetic drugs and later may include an injectable treatment. Recommended glycemic goals are achieved by less than 50% of patients, which may be associated with reduced adherence to therapies, and may lead to complications of diabetes over time(16). Adherence to long-term exercise programs can vary between 10% and 80%. Data from different studies show that adherence to oral hypoglycemic agents (OHA) ranged from 36% to 93% in patients remaining on treatment for 6–24 months. In retrospective insulin studies, adherence was 62% and 64% for long-term and new-start insulin users, respectively. Reasons for non adherence to therapies include age, information, perception and duration of

disease, complexity of dosing regimen, poly therapy, psychological factors, safety, tolerability and cost(17) .Measures to increase therapy adherence in type 2 diabetes include reducing complexity by fixed-dose combinations and less frequent dosing requirements, using medications with improved safety profile, educational initiatives, improved patient-healthcare provider communication and social support, which may help to reduce costs. The prevalence of antidiabetic drug adherence found in this study was suboptimal. Several factors were inconsistently associated with poor adherence to anti-diabetic treatment. They include regimen complexity, cost and side effects of medications, advanced age, female gender, long duration of diabetes, and comorbid conditions such as hypertension, hyperlipidemia, coronary artery disease and depression(18). In this study, good adherence was found among elderly patients. the patients in the middle age group of 41-50 years had the poorest adherence. In this study gender was not associated with adherence, however; - other studies found female gender to be associated with poor anti-diabetic medication adherence(19). This could be explained by the fact that women are more prone to stress and to develop mental and emotional disorders like depression, the factors not assessed in the current study. Another interesting factor that was associated with adherence was the concurrent use of non- diabetic medications with anti-diabetic drugs. The use of other medications in addition to anti-diabetic drugs was significantly associated with a good adherence. These patients are likely to have multiple comorbidities, attend different clinics and hence more information on the benefits of compliance to medications. Multiple comorbidities are also likely to occur with aging. Thus, age-related improved adherence may partly be explained by increased comorbidities. Other social demographic characteristics analyzed were level of education and religion, they were not associated with anti- diabetic drug adherence. Likewise, the duration of diabetes and the number of anti-diabetic drugs used had no significant association with degree of anti-diabetic medications adherence. Majority of patients in this study were either overweight or obese, the two accounted for 72.7% of all patients. Being obese or overweight has been found to have a negative influence on adherence resulting to patients not following dietary advice or fear of weight gain associated with medication use(20). Failure to afford medications was the most common reason for poor adherence. Drug side effect was the other reason associated with poor adherence. In this study, patients who had good glycemic control had better adherence to anti-diabetic drugs compared to those who had poor glycemic control, however; -this was not statistically significant(21).

Conclusion:

It is evident from many studies that type 2 diabetes is a progressive disease pharmacologic treatment is essential to maintain glycemic control and reduce adverse cardiovascular outcomes. Even though adherence to medications leads to beneficial outcomes, it was found to be suboptimal. High cost of medications was significantly associated with poor antidiabetic drug adherence, other reasons for poor adherence including age, social and psychological factors, education and a lack of understanding of the long-term benefits of treatment, the complexity of the medication regimen, cost of medication and negative treatment perceptions. Poor communication between doctor and patient, adverse outcomes such as weight gain and hypoglycemia, and failure of clinicians to modify medications appropriately can also affect adherence. New innovative methods are needed to assist those patients who fail in their medication compliance. Measures to increase patient satisfaction and counteract a lack of adherence must be multifactorial; strategies should include a reduction in the complexity of the prescription regimen, educational initiatives, improved doctor– patient communication, reminder systems and reduced costs.

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