The Causes of Non-Compliance to Treatment Among Type 2 Diabetes Mellitus Patients

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ABSTRACT

Background: Generally, type 2 diabetes mellitus can end with many complications, which leads to severe unwanted health problems that can be prevented by strict adherence to the prescribed methods of management conducted by the physician. So, this study was designed to evaluate the range of the patient’s compliance to therapy (drug, diet, and exercise).

Methods: An analytic cross-sectional study evaluated 380 convenient samples with type 2 diabetes visiting private internal medicine clinics in Al-Kut city and over 18 years. All patients were consented to participate and full a pre-tested questionnaire consisting of questions related to the causes of non-compliance to the management protocol.

Results: The sample consisted of 209(55%) females, 9.18% were from urban regions, and 43.2% had a college degree or above educational level. There were 64.2% who was continuously measuring their glucose level, but only 39.2% visiting the doctors regularly. On the other hand, most patients (78.4%) declared that they complied with drug therapy. On the other hand, only 20.5% of patients always follow the doctor’s instructions regarding a healthy diet, while 9.7% mentioned compliance with regular exercise. The significant causes of non-compliance to the drug were costly drugs in (25.4%) and (19.8%) for the forgetting. There were 123(62.4%) who did not care about healthy food, and 119(42%) could not practice exercise because they could not do that.

Conclusion: The higher rate of non-compliance for diet and exercise focuses on the need for an actual intervention to increase the awareness about the importance of these two management types.

Keywords: diabetes mellitus, adherence, compliance, anti-diabetic drugs, healthy diet

INTRODUCTION

The disease Diabetes mellitus (DM) is one of the metabolic disorders distinguished by high blood sugar rises from either defect in secretion of insulin (type1), insulin activity (type2), or mixed [1]. Even though type 2 diabetes usually occurs in individuals above 40 years old, it is becoming progressively common in children, teenagers, and youthful grown-ups due to diminished physical movement and unhealthy eating foods driving obesity [2]. The predominance of diabetes mellitus is developing quickly around the world and is becoming to be an epidemic. It is evaluated that there are now 285 million individuals with diabetes worldwide and expected to reach 438 million by 2030 [3]. Epidemiological information shows that all countries, wealthy and destitute, are enduring the effect of the diabetes epidemic. The effect is worse in those nations that are socially and financially impeded. In Africans, 80% of diabetes patients are undiscovered. Most of them may be asymptomatic or have gentle indications which they disregard or quality to other myths. A few may not display in a clinic out of destitution when symptomatic because of poverty [4]. DM could be a challenging disease to be treated effectively. It requires regular physician visits, self-monitoring of blood glucose, dietary alterations, works out, and organization of medicines as per plan. So, regimen adherence issues are common in people with diabetes, hence making glycemic control troublesome to achieve [5-7]. Later information from the American Diabetes Association (ADA) targets HbA1c levels less than 6% is broadly utilized as the standard biomarker for the amleness of glycemic control [8,9].

In order to manage patients with diabetes mellitus, there are two approaches, including pharmacological drugs and other nonpharmacological methods. The nonpharmacological procedures incorporate changing lifestyle, dietary alteration, and physical activity. The pharmacological approach is utilized when the nonpharmacological approach cannot attain the required result [10]. Many factors contribute to successful management programs like age,
the number and complexity of medication, disease duration, and related psychosocial issues [11].

Adherence rates are ordinarily higher among patients with acute conditions than those with chronic conditions [12]. Researchers have found that adherence to medications in chronic disease can reach only 50% [13,14]. Numerous diabetic patients fail to follow their management regimen for different reasons, including forgetfulness, reduced understanding of the nature of their condition, prohibitively expensive drugs, and their old-style views of the illness. Other related distinguished factors are depression and emotional distress, arrangements that do not start on time, insignificant provider-patient relationship, the difficulty of regimen, restricted daily life activities, and fear of hypoglycemia at any time [15]. Poor compliance with medication is considered a common problem is contributing to an effective rate of complication and death among patients. Specialist physicians need to continuously search for the adherence rate among patients and focus on the leading causes of poor adherence by making the regimen simple, efficiently conducted, and appropriate to the patient’s lifestyle.

The problem seen in previous research about the same topic includes lack of adherence, aggravation of complications, lack of exercise, non-adherence to a healthy diet, and other factors that led us to fill the gap and search for many answers concerning our research. Therefore, this study aimed to determine the prevalence of non-adherence and the contributing factors among type 2 diabetic patients in Wasit province, Iraq.

PATIENTS AND METHODS

Study Design and Setting

An analytic cross-sectional study was conducted among type 2 DM patients visiting private internal medicine clinics in AL-Kut city, Wasit province/ Iraq. AL-Kut is the centre of Wasit province, which is located in the middle of Iraq. According to the latest Iraqi census in 2014, it is assumed that around 422,793 people lived in this city from the total one and a half million people who lived in Wasit. There are many private clinics for diabetes management distributed in the city, reaching around 40 clinics. Data were collected during the period from December 2020 to May 2021.

Sample Size and Sampling Procedure

The sample was collected conveniently from 10 randomly selected internal medicine private clinics in AL-Kut city. The sample size was calculated based on the equation for cross-sectional studies, which is: 
\[ n = \left( \frac{Z^2 \times \pi \times (1 - \pi)}{d^2} \right) \]
considering the prevalence of good knowledge (45%) [16], the confidence level (95%), \( d = 0.05 \), and the power (80%), the minimal sample size required for this study was 380 patients.

Inclusion Criteria

Patients previously diagnosed with type 2 DM and aged more than 18 years.

Exclusion Criteria

Patients with acute and painful conditions urgently want to back home.

Data Collection

Data were collected using a structured questionnaire developed by the authors and consisting of two parts; part one contained socio-demographic features like age, gender, marital status, educational status, occupation, and place of living. The second part includes data about the prescribed methods for controlling the levels of blood sugar, which were: oral medications, a healthy diet, exercising, and insulin. In addition, causes of non-compliance to each type of treatment were also included. The presence of other chronic conditions and the duration of diabetes were also documented.

Before initiating the formal test on about ten diabetic patients, the questionnaire was pre-tested to do any necessary correction and clearness. Questionnaires were self-administered and distributed to selected patients in the selected clinics and then returned after complete filling. Body Mass Index (BMI) was calculated for each student according to their weight and height and classified according to Centres for Diseases Control and Prevention (CDC) classification to underweight, normal, overweight, and obese [17].

Statistical Analysis

Statistical Package for Social Sciences (SPSS) software version 26 was used for data analysis. Categorical data were presented by frequency and percentages, while continuous data were presented by mean and standard deviation. Association between categorical variables was obtained by Chi-square test while differences between means were calculated by both independent sample t-test and One way ANOVA test. P-value equal to or less than 0.05 was considered significant.

Ethical Consideration

Ethical approval was obtained from the College of Medicine, Wasit University. All participated patients gave their informed consent to fill the questionnaire after being informed about the study's objective and keeping their data confidential.

RESULTS

The result of this study was based on the analysis of 380 completed questionnaires from patients diagnosed with type 2 DM. The mean age and standard deviation for those patients were (49.11±16.78) years, and the mean BMI was (27.56±5.22) kg/m². Female patients represented more than half (55%) of the participants, and most of the patients (66.6%) were married. Table 1 also shows that the majority (91.8%) living in urban places. There were 183 patients (43.2%) having their college degree even that (39.2%) were unemployed or students. Only 2.6% of the sample were underweight, and 29% had average weight; the remaining were overweight and obese.

Table 2 shows that 185/380 (48.7%) mentioned having other chronic diseases; only 6/185 (3.2%) did not use drugs for this disease. Hypertension was the most frequent chronic disease that accompanies diabetes in about 153 patients (64%). Note that patients may have more than one other chronic condition in addition to DM.

Near one-third of the sample (30.8%) was diagnosed with DM before more than ten years. Although 244 of the patients (64.2%) were regularly measuring their glucose level, 60.8% of patients never visit their physicians regularly because 46.3% feel no need to that, and 34.2% had an economic barrier. The treatment prescribed by doctors was
mainly oral tablets (47.9%), nutritional therapy (29.2%), insulin (12%), and exercise (10.9%) (Table 3).

Reasons for non-compliance to treatment were presented in Table 4. Among those 82/380 (21.6%) patients who did not adhere to their drugs, 32 patients (25.4%) defined expensive drugs as a significant cause, followed by 19.8% who forget drugs, and 15.9% were careless about their treatment therapy. Only three patients (2.4%) did not understand the correct way of using it. Near one quarter, 24% said they did not
adhere to the prescribed healthy dietary regime; the leading cause was
carelessness in 62.4%, followed by the inability to provide this type of
food in 12.7%. Only 39(9.7%) of patients practice regular exercise. Of
the remaining 341 patients, there were 221 who never do any exercise
at any time, and the major causes were that they were not able to do it
(42%) and having no time (32.9%).

The results of Table 5 found a significant association between
occupation with the three types of treatment (drugs, diet, and exercise)
with p-values 0.006, 0.017, and 0.020 in the same order.

The gender of the patients was associated with only exercise (p-
value = 0.008). Educational level was associated with compliance to diet
and exercise (p-value = 0.021, 0.002) in respectively. Age and marital
status were significantly associated with drug and exercise adherence
(p-value < 0.001). The average family monthly salary was associated
with only drug compliance (p-value < 0.001), while the BMI category
was associated with both diet and exercise (p-value for diet = 0.003 and
exercise = 0.023).

**DISCUSSION**

As the adherence to treatment in patients living with chronic
diseases like DM is of significant effect in controlling symptoms and
preventing future complications, a community-based cross-sectional
study was done to estimate the prevalence of treatment non-
compliance among patients with type 2 DM and also to determine the
factors associated. The management of diabetes mellitus includes both
pharmacologic and nonpharmacologic methods. To be well controlled
and treated, patients need to comply with all doctor instructions to get
the required objective from both approaches. Despite this reality, many
patients never adhere to their suggested treatments and doctor advice
which may be related to a lot of contributed factors [18].

In the current study, we noticed that the number of females who
participate in the study slightly exceeds the number of males, and this
may be related to the fact that females are generally more than males in
our country [19] or were more interested in participation rather than
males. Even there was no definite difference between both sexes in the
prevalence of DM, previous studies found a significant increase in the
prevalence of DM among women relative to men, and this also can
explain the higher percentage of females in our sample [20,21]. The
majority of the patients were overweight and obese because it is a
known risk factor for type 2 DM. It was proven that obesity could cause
a disturbance in the mechanism of insulin resistance in responsive cells,
including liver, muscle, and adipocyte leading to reducing their
responsiveness to insulin and, finally, type 2 DM [22-24]. Patients in
this study mainly came from urban regions rather than rural areas,
maybe because of ease of access to private clinics in city centres. In
addition, people with higher educational levels tend to participate more
than people with lower educational levels.

Literature assumed that patients with long-term conditions show a
relatively low level of medication adherence, especially after six months
from starting the treatment, and this is still the top priority for
governmental and non-governmental organizations to work on
[12,25]. However, the current study showed that more than three-
quarters of patients reported good compliance to medication and
(21.6%) missed their medication treatments. This result was better than
rates showed the Indian diabetic population in 2018 with 29.7% non-
compliance to medications [26]. Another study conducted in Ajman
appeared an 84% compliance rate to treatment, and patients related this
to expanded mindfulness and advantage from the broadly dispersed data

| Table 4. Frequency of compliance to treatment and causes for non-compliance among type 2 DM patients |
|---------------------------------------------------------------|
| **Variables** | **Frequency** | **Per cent** |
| **Do you comply with drug therapy?** | | |
| Yes | 298 | 78.4 |
| No | 82 | 21.6 |
| Feel no need for drugs | 5 | 4.0% |
| Careless | 20 | 5.9% |
| Lots of treatments | 12 | 9.5% |
| The side effect of drugs | 10 | 7.9% |
| Expensive drugs | 32 | 25.4% |
| Not understand the way | 3 | 2.4% |
| Forget | 25 | 19.8% |
| Long treatment period | 11 | 8.7% |
| Drugs not available | 8 | 6.3% |
| **Causes of non-compliance to oral tablets** | | |
| **Do you comply with food prescribed by the doctor?** | | |
| Yes, always | 78 | 20.5% |
| Yes, sometimes | 211 | 55.5% |
| Not adhered at all | 91 | 24% |
| Not able to provide healthy food | 25 | 12.7% |
| Don’t care | 123 | 62.4% |
| No time for prepare food | 22 | 11.2% |
| No one help in preparing the food | 21 | 10.7% |
| Not able to control my appetite | 6 | 3.0% |
| **Causes of non-compliance to healthy food** | | |
| **Do you practice exercise?** | | |
| Yes, regularly | 37 | 9.7% |
| Yes, irregularly | 122 | 32.1% |
| No exercise at all | 221 | 58.2% |
| No time | 93 | 29.9% |
| No suitable place | 67 | 23.7% |
| Not interested or care | 4 | 1.4% |
| Not able to do | 119 | 42.0% |
Table 5. Association between compliance to treatment with the selected socio-demographic feature of patients.

| Variables | Compliance with drug | Compliance with healthy diet | Compliance with the exercise |
|-----------|----------------------|------------------------------|-----------------------------|
|           | Yes | No | P-value | Yes | No | P-value | Yes | No | P-value |
| Gender    |     |    |         |     |    |         |     |    |         |
| Male      | No. | 139| 32      |     | 37 | 96      |     | 22 | 64      |     | 0.219 |
|           | %   | 46.6| 39      |     | 47.4 | 45.5 | 41.8 |     | 59.5 | 52.3 | 38.3 | 0.008 |
| Female    | No. | 159| 50      |     | 52.6 | 54.5 | 58.2 |     | 45.5 | 47.5 | 61.5 |        |
|           | %   | 53.4| 41      |     | 41 | 115 | 53 |     | 15 | 58 | 136 |        |
| Governmental | No. | 75 | 22      |     | 22 | 54 | 21 |     | 8 | 43 | 46 |        |
|           | %  | 25.2 | 26.8 |     | 28.2 | 25.6 | 23.1 |     | 21.6 | 35.2 | 20.8 |        |
| Retired   | No. | 70 | 7       |     | 18 | 43 | 16 |     | 6 | 16 | 55 |        |
|           | %  | 23.5 | 8.5 |     | 23.1 | 20.4 | 17.6 |     | 16.2 | 13.1 | 24.9 | 0.020 |
| Self-employed | No. | 47 | 10      |     | 8 | 24 | 25 |     | 4 | 16 | 37 |        |
|           | %  | 15.8 | 12.2 |     | 10.3 | 11.4 | 27.5 |     | 10.8 | 13.1 | 16.7 |        |
| Not employed | No. | 106| 43      |     | 30 | 90 | 29 |     | 19 | 47 | 83 |        |
|           | %  | 35.6 | 52.4 |     | 38.5 | 42.7 | 31.9 |     | 51.4 | 38.5 | 37.6 |        |
| Place of living | Urban | No. | 278 | 71 | 71 | 197 | 81 |     | 35 | 110 | 204 |        |
|           | %  | 93.3 | 86.6 |     | 91.0 | 93.4 | 89.0 |     | 94.6 | 90.2 | 92.3 | 0.639 |
| Rural     | No. | 20 | 11      |     | 7 | 14 | 10 |     | 2 | 12 | 17 |        |
|           | %  | 6.7 | 13.4 |     | 9 | 6.6 | 11.0 |     | 5.4 | 9.8 | 7.7 |        |
| No education | No. | 39 | 8       |     | 9 | 19 | 19 |     | 2 | 9 | 36 |        |
|           | %  | 13.1 | 9.8 |     | 11.5 | 9 | 20.9 |     | 5.4 | 7.4 | 16.3 |        |
| Below secondary | No. | 44 | 17      |     | 14 | 28 | 19 |     | 5 | 10 | 46 |        |
|           | %  | 14.8 | 20.7 |     | 17.9 | 13.3 | 20.9 |     | 13.5 | 8.2 | 20.8 | 0.002 |
| Secondary | No. | 67 | 22      |     | 15 | 53 | 21 |     | 9 | 34 | 46 |        |
|           | %  | 22.5 | 26.8 |     | 19.2 | 25.1 | 23.1 |     | 24.3 | 27.9 | 20.8 |        |
| College & above | No. | 148| 35      |     | 40 | 111 | 32 |     | 21 | 69 | 93 |        |
|           | %  | 49.7 | 42.7 |     | 51.3 | 52.6 | 35.2 |     | 56.8 | 56.6 | 42.1 |        |
| Marital status | Single | No. | 43 | 37      |     | 19 | 47 | 14 |     | 15 | 43 | 22 |        |
|           | %  | 14.4 | 45.1 |     | 24.4 | 22.3 | 15.4 |     | 40.5 | 35.2 | 10 | <0.001 |
| Married   | No. | 212| 41      |     | 48 | 142 | 63 |     | 19 | 74 | 160 |        |
|           | %  | 71.1 | 50 |     | 61.5 | 67.3 | 69.2 |     | 51.4 | 60.7 | 72.4 | <0.001 |
| Divorced or widow | No. | 43 | 4       |     | 11 | 22 | 14 |     | 3 | 5 | 39 |        |
|           | %  | 14.4 | 4.9 |     | 14.1 | 10.4 | 15.4 |     | 8.1 | 4.1 | 17.6 |        |
| Average monthly salary | <50000 | No. | 81 | 40      |     | 24 | 66 | 31 |     | 15 | 34 | 72 | 0.096 |
|           | %  | 27.2 | 48.8 |     | 30.8 | 31.3 | 34.1 |     | 40.5 | 27.9 | 32.6 |        |
| IQ, D     | No. | 107| 26      |     | 26 | 72 | 35 |     | 6 | 44 | 83 |        |
|           | %  | 35.9 | 31.7 |     | 33.3 | 34.1 | 38.5 |     | 16.2 | 36.1 | 37.6 |        |
| 50000-1 million | No. | 110| 16      |     | 28 | 73 | 25 |     | 16 | 44 | 66 |        |
|           | %  | 36.9 | 19.5 |     | 35.9 | 34.6 | 27.5 |     | 43.2 | 36.1 | 29.9 |        |
| More than 1 million | No. | 5 | 5       |     | 2 | 5 | 3 |     | 0 | 3 | 7 |        |
| Bodyweight | Under weight | No. | 86 | 24      |     | 22 | 69 | 19 |     | 17 | 42 | 51 | 0.003 |
|           | %  | 28.9 | 29.3 |     | 28.2 | 32.7 | 20.9 |     | 45.9 | 34.4 | 23.1 | 0.023 |
| Normal weight | No. | 86 | 24      |     | 36 | 89 | 27 |     | 15 | 48 | 89 |        |
|           | %  | 28.9 | 29.3 |     | 46.2 | 42.2 | 29.7 |     | 40.5 | 39.3 | 40.3 |        |
| Overweight | No. | 86 | 22      |     | 18 | 48 | 42 |     | 5 | 29 | 74 |        |
|           | %  | 28.9 | 26.8 |     | 23.1 | 22.7 | 46.2 |     | 13.5 | 23.8 | 33.5 |        |
| Obese     | No. | 86 | 22      |     | 23 | 48 | 42 |     | 5 | 29 | 74 |        |
|           | %  | 28.9 | 26.8 |     | 23.1 | 22.7 | 46.2 |     | 13.5 | 23.8 | 33.5 |        |
| Age in years | Mean age | 51.47 | 40.51 |     | 49.86 | 47.49 | 52.21 |     | 42.76 | 43.05 | 53.51 | <0.001 |
|           | Standard deviation | 16.10 | 16.47 |     | 18.39 | 16.96 | 14.45 |     | 19.44 | 17.75 | 14.26 |        |

Concerning their disease and medications straightforwardly from their doctor and involve them in decision making about their treatment [27].

Patients within the current study appeared that they were more adherence to dietary instructions than practicing physical activity. Our rate was nearly similar to the rate shown in Alexandria, Egypt, which found that 58.8% of patients complied with diet while only 51.7% were compliant to exercise [28]. This may be due to easy to control diet and follow doctor instructions than performing a regular healthy exercise the simpler to take after healthy diet instructions than an exercise administration. The highest percentage of the patients said they could not exercise; others mentioned having no time or suitable place to do
so. In Northern Finland, dietary adherence has been mentioned by (62.4%) diabetic patients [29].

The gender of the patient was significantly associated with the level of practising exercise. Females were less likely to be compliant with exercise than males, and this is not surprising in our community, which restricts females' freedom and their jobs in homes, making them busy most of the time—increasing educational level significantly leading to increasing compliance to medications, healthy diet, and exercise. This has already been proved by studies conducted in Saudi Arabia and the United Arab Emirates (UAE) [30,31] and may be related to their awareness of diabetic complications, which may be leading to ending their lives [32]. Furthermore, the married patients showed a significantly higher percentage of drug and exercise which can be linked to the tremendous support their spouse or other relations. Similar results were also shown in the Saudi Arabia study [30].

In this study, the occupation is associated with treatment adherence, like in the Bisha governorate of Saudi Arabia [33]. Non-employed or student patients who had a higher percentage of compliance in all aspects of treatment (drug therapy, diet, and exercise) may be due to the availability of time to take care of their health and follow doctor’s instructions. The monthly family salary is significantly associated with compliance to drug therapy as a close-quarter of patients mentioned the expensive cost of the drugs as a barrier to adhere to medication. Similarly, Wabe et al. concluded that 37% of non-adherent Ethiopian patients had financial limitations [34]. This is a significant problem because numerous anti-diabetic medications are so expensive that patients need to use them continuously. This problem should be resolved by arranging free drugs for patients from the hospitals [35]. Patients with lower monthly salaries were less likely to adhere to their medications than those with a monthly salary between (500.000 -1 million IQ, D) or greater than 1 million (note that each 1$ averaged 1450-1500 Iraqi Dinars). Previous studies conducted in different world regions reported lower income led to lower medication adherence [18,34,36,37]. They explained this as those who obtain more money are paying more for their health and treatment, and they can pay for varied suppliers of medication information, including books, television, radios, and magazines. Forgetting was the second most common reason for non-compliance to drugs in our current study. On the contrary, our finding was shown to be the most typical reason for non-compliance by Nigerian patients [38]. Most of the participants in this study were in their seventh to the eighth decade and may complain of memory impairment problems.

According to Barclay et al. [39], dietary modification is required for type 2 diabetes mellitus patients. This includes a diet low in saturated fat, sodium and carbohydrate, and high fibre contents. The importance of dietary modification in patients with type 2 diabetes is to decrease body weight by about 5-10%, controlling blood sugar, and prevent or reduce future complications like cardiovascular and renal problems. Unfortunately, most patients in this study suffer from overweight and obesity, which was found to be associated with their compliance to dietary instructions and exercise.

LIMITATIONS

There are some limitations in our study, such as the majority of respondents were with high educational levels, and the selected clinics were from city centres only. The other problem we faced was the Coronavirus pandemic which affected the number of samples, and perhaps there are some non-committal people that we could not see to know the reasons for their non-compliance.

CONCLUSION AND RECOMMENDATIONS

In conclusion, it turns out that the majority of the patients respond to the drugs prescribed by their doctor. In comparison, a minority do not get them due to the expense of the drugs. Finally, another line was studied, which is the food restriction. Here, a significant number of the collected sample do not comply with a healthy diet due to their carelessness. As for exercise, ups and downs ranged from no time to do sport to not being able to.

This study recommends a governmental intervention with the costs and accessibility of the drugs utilized to treat DM. Awareness programs encourage a healthy lifestyle. Furthermore, define its significance for individuals with type 2 DM. Further studies are recommended to assess different adherence and non-adherence issues within the region.

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