

# Adherence to oral hypoglycemic medication among patients with diabetes in Saudi Arabia

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## ABSTRACT

**Introduction:** Diabetes mellitus is a chronic progressive disease characterized by numerous health complications. Medication adherence is an important determinant of therapeutic outcome. The objective of this study was to assess hypoglycemic medication adherence.

**Materials and Methods:** This is a descriptive cross-sectional web-based study. The eight-item Morisky medication adherence scale was used to assess adherence.

**Results:** A convenience sample of 290 patients with diabetes was studied; of them, 10.7% had a high adherence, 34.5% had a medium adherence, and 54.8% had a low adherence level. Adherence score was positively and significantly correlated with age ( $P < 0.05$ ). Similar significant correlation was found between adherence level and gender ( $P < 0.05$ ). However, adherence was not significantly associated with diabetes duration of disease ( $P > 0.05$ ) and number of hypoglycemic medications ( $P > 0.05$ ).

**Conclusion:** The majority of patients with diabetes in this study had low adherence rate. The three main factors may contribute to non-adherence to medication are non-adherence to regular follow-up in diabetes clinic, non-adherence to healthy diet, and non-adherence to instruction to take medication.

**Keywords:** Adherence, oral hypoglycemic, Saudi Arabia

## Introduction

The world prevalence of diabetes mellitus (DM) in the year 2000 was estimated to be 171 million people.<sup>1</sup>

Recent data estimated that number of patients currently having diabetes to be 415 million adults and is expected to increase to about 642 million people as of 2040. The percentage of increase in DM in the Arab world is expected to increase from 35.4 million in 2015 to 72.1 million in 2040.<sup>2</sup>

Inadequate management of diabetic patients will increase the risk of developing diabetes complications which will have negative impact on the health system.<sup>3,4</sup>

However, implementing protocols to control the disease and introducing methods to improve the adherence to treatments and self-management by patients will help attaining optimal glycemic control and hence reducing the complications and the risk of death.<sup>5,6</sup> Poor knowledge about medication and treatment goals, perceptions about the medication, complexity of regimens, side effects, and cost are the main causes of non-adherence to medication.<sup>7,8</sup>

The purpose of this study was to assess patient adherence to oral hypoglycemic medications and factors contributing to non-adherence in patients with Type 2 diabetes.

## Materials and Methods

This is a descriptive cross-sectional study. A structured pretested questionnaire was disseminated online by the Google search engine targeting patients with Type 2 diabetes in Kingdom of Saudi Arabia.

The data were collected using a structured pretested questionnaire designed in three sections.

Section one contains demographic data and medical history; section two (eight-item Morisky medication adherence scale [MMAS-8]) was used to assess the level of adherence. MMAS-8 contains 8 yes or no questions and answers to measure patient adherence to hypoglycemic drug. It highlights forgetfulness of medication, measures medication use in the last 2 weeks, stops to take medication when feel worse, forget to take medication when travel or go out of home, measures medication use in yesterday, stops to take medication when

feel better, feeling dissatisfaction due to daily commitment to take hypoglycemic medicine, facing difficulties to remember to take all medications.

The maximum score 8 represents high adherence, 6-<8 score represents medium adherence, and <6 score represents low adherence.<sup>9</sup>

Section three contains seven questions; it reflects barriers to adherence to hypoglycemic drug through measure patient commitment to follow-up in diabetic clinic, reasons for not commitment, following instruction for diet, following instruction for exercise, information related to using the medication, relationship to health-care provider, suffering from side effect of drug.

Questionnaire developed in the Google drive; questionnaire link is then disseminated through social media.

All patients who fill in the questionnaire from 6 March 2016 to 30 March 2016 were included in the study.

## Ethical considerations

The research is in accordance with the Declaration of Helsinki 1975 as revised in 2000. The objectives of the study were explained online to patients.

All patients fill in the questionnaire from 6 March 2016 to 30 March 2016 were included in the study. A total of 290 patients were enrolled.

Data were analyzed using computer-based Statistical Package for Social Science version 21.

For qualitative data (gender, education level, marital status, duration of the disease, comorbidities, drug regimen, income, smoking, committed to follow-up, relationship with prescribers, suffering from side effects, adherence level), frequency and percent were used. Chi-square test was used to compare the level of adherence with difference in age, education level, marital status, disease duration, drug regimen, monthly income, and smoking with. Regression analysis was used to find the possible factors for non-adherence.

$P < 0.05$  was considered statistically significant.

## Results

### Demographic data and medical history

Out of total 290 of patients with diabetes, the majority (65.9%) were female. Regarding level of education, 50% were college graduate and above, 22% are high school, 19% are primary school, and only 9% are secondary school graduates. Regarding marital status, 211 (72.8%) were married, 48 (16.6%) single, 22 (7.6%) widow, and 9 (3%) divorced.

Duration of the disease ranges: 115 (40%) from 5 years or less, 67 (23%) from 6 to 10 years, 43 (15%) from 11 to 15 years, 38 (13%) from 16 to 20 years, 27 (9%) for more than 20 years.

Of the total, 149 (51%) have other comorbidities while 141 (49%) not have other comorbidities. These morbidities include 73 (49%) hypertension, 42 (28%) dyslipidemia, 9 (6%) heart disease, and 25 (17%) for others.

Most of the patients 81 (27.9%) take more than three drug, 75 (25.9%) take three drugs, 71 (24.5%) take one drug, and 63 (21.7%) take tow drug.

Majority 99 (34.1%) have 5000-10000 SR income, 85(29.3%) have <5000 SR income, 54 (18.6%) have more than 15000 SR income, 52 (18%) have 11000-15000 SR income.

In most of the patients with diabetes, 256 (88%) were non-smoker, 17 (6%) were smoker, 17 (6%) were previous smokers.

The majority of patients 158 (54.5%) were always committed to follow-up in the clinic, where 132 (45.5%) not committed to follow-up.

For those who are not committed, the reasons behind non-commitment are, they did not think it is necessary to follow-up 54 (40.8%), forgot the appointment 33 (25.1%), non-availability of transport 26 (20%), and 19 (14.1%) specified other reasons.

Of the total, 107 (37%) of patients stated that they follow the doctor instruction while 183 (63%) were not.

Furthermore, 240 (82.8%) of patients with diabetes said that the drug information was enough to them, where 50 (17.2%) said that it was not enough.

Nevertheless, most (53, 40.8%) of the patients did not think it necessary for follow-up, where others forgot the appointment (30, 25%), non-availability of transport (24, 20%), and (13, 14.2%) specified other reasons.

Of the total, 107 (37%) of patients stated that they follow the doctor instruction, while 183 (63%) were not.

The majority of patients 159 (54.8%) do not have relationship with their caregivers, while 131 (45.2%) have good relationship

Most of the patients (191, 66%) not suffer from drug side effect were (99, 34%) suffered from side effect.

### Adherence

Adherence level was obtained according to Morisky scale, Table 1 shows classification of patients according to adherence level.

Table 2 shows the classification of patients' age groups with different adherence level.

Comparison education level based on adherence level shown in Table 3.

Comparison of patients' adherence according to marital status, drug regimens, smoking status are shown in Tables 4-6, respectively.

Factors that can be directly related to non-adherence are shown in Table 7.

## Discussion

The results of the present study show that among the participants, 159 patients (54.8%) had low adherence, 100 patients (34.5%) had medium adherence, and only 31 patients (10.7%) had a high adherence. Our results are inconsistent with the results of Shaimol *et al.*<sup>10</sup> who studied the adherence of 400 diabetic patients using MMAS, they found that the least percentages of patients (21.8%) have high adherence, 35.3% have medium adherence, 43% have low adherence. In another earlier study by Heissam *et al.*<sup>11</sup> conducted in 376 patients, using the measure treatment adherence scale, they found that 98 (26.1%) have high adherence level, 180 (47.9%) have fair adherence level,

and 99 (26%) have poor adherence level. However, the results are not in agreement with the results of other researchers; according Jamous *et al.*,<sup>12</sup> out of 130 patients there were 50 patients (38.5%) had high adherence, 58 (44.6%) had medium adherence, and 22 (16.9%) had low adherence rate. Also, Fadare *et al.*<sup>13</sup> conducted a study on 129 patients and classified patients as good, medium, and poor for 52 (40.6%), 42 (32.8%), and 34 (26.6%) patients, respectively. This difference in results of adherence level may be attributed to the differences in awareness about the importance of adherence to medication and may be also there are differences in strategies in different to improve adherence in different countries.

The current study also noted that patients with higher age (53.6 years) found to have significant ( $P < 0.05$ ) high level of adherence to medications than patients with lower age (43 years). This result is inconsistent with what was found in Fadare *et al.* study<sup>13</sup> which shows no significant difference in terms of adherence with different age groups ( $P > 0.05$ ), and the study by Arifulla *et al.*<sup>14</sup> in a total of 132 patients they found no significant difference in adherence with regard to age ( $P > 0.05$ ). Nevertheless, in the study by Gelaw *et al.*,<sup>15</sup> a total of 270 patients were interviewed, and they reported different result as the researchers found increase in age seemed to have statistically significant influence ( $P < 0.05$ ) on respondents' tendencies to have good adherence. This difference in results may be due to the good supportive social relationship in

**Table 1:** Adherence level

| Level of adherence | Frequency (%) |
|--------------------|---------------|
| Low adherence      | 159 (54.8)    |
| Medium adherence   | 100 (34.5)    |
| High adherence     | 31 (10.7)     |
| Total              | 290 (100.0)   |

**Table 2:** Comparison of age based on adherence

| Level of adherence | Mean of age | 95% CI for mean |             | P value |
|--------------------|-------------|-----------------|-------------|---------|
|                    |             | Lower bound     | Upper bound |         |
| Low adherence      | 43.0063     | 40.6663         | 45.3464     | 0.000   |
| Medium adherence   | 49.9000     | 46.9654         | 52.8346     |         |
| High adherence     | 53.6667     | 47.8542         | 59.4791     |         |
| Total              | 46.5104     | 44.7235         | 48.2973     |         |

CI: Confidence interval

**Table 3:** Comparison of adherence level based on education level

| Education level            | Adherence (%) |        |      | Total (%) | P value |
|----------------------------|---------------|--------|------|-----------|---------|
|                            | Low           | Medium | High |           |         |
| Primary                    | 13.2          | 23.0   | 35.5 | 19.0      | 0.017   |
| Intermediate               | 7.5           | 11.0   | 9.7  | 9.0       |         |
| High                       | 22.0          | 20.0   | 29.0 | 22.1      |         |
| College graduate and above | 57.2          | 46.0   | 25.8 | 50.0      |         |
| Total count                | 159           | 100    | 31   | 290       |         |

**Table 4:** Comparison of marital status based on adherence levels

| Marital status | Adherence (%) |        |      | Total | P value |
|----------------|---------------|--------|------|-------|---------|
|                | Low           | Medium | High |       |         |
| Single         | 21.4          | 12.0   | 6.5  | 16.6  | 0.016   |
| Married        | 67.3          | 81.0   | 74.2 | 72.8  |         |
| Widow          | 3.8           | 3.0    | 0.0  | 3.1   |         |
| Divorced       | 7.5           | 4.0    | 19.4 | 7.6   |         |
| Total count    | 159           | 100    | 31   | 290   |         |

**Table 5:** Comparison of drug regimen based on adherence

| Drug regimen         | Adherence (%) |        |      | Total | P value |
|----------------------|---------------|--------|------|-------|---------|
|                      | Low           | Medium | High |       |         |
| One drug             | 25.8          | 26.0   | 12.9 | 24.5  | 0.224   |
| Two drug             | 21.4          | 23.0   | 19.4 | 21.7  |         |
| Three drug           | 28.9          | 18.0   | 35.5 | 25.9  |         |
| More than three drug | 23.9          | 33.0   | 32.3 | 27.9  |         |
| Total count          | 159           | 100    | 31   | 290   |         |

**Table 6:** Comparison of smoking status based on adherence

| Smoking     | Adherence (%) |        |       | Total (%) | P value |
|-------------|---------------|--------|-------|-----------|---------|
|             | Low           | Medium | High  |           |         |
| No          | 92.7          | 92.5   | 100.0 | 93.4      | 0.304   |
| Yes         | 7.3           | 7.5    | 0.0   | 6.6       |         |
| Total count | 150           | 93     | 30    | 273       |         |

**Table 7:** Factors contribute to non-adherence

| Factors                 | OR    | CI (OR) |       |
|-------------------------|-------|---------|-------|
|                         |       | Lower   | Upper |
| Follow-up in the clinic | 2.818 | 1.697   | 4.682 |
| Diet instruction        | 2.823 | 1.676   | 4.756 |
| Drug use information    | 2.050 | 1.016   | 4.137 |
| Drug side effect        | 0.605 | 0.355   | 1.033 |

OR: Odds ratio, CI: Confidence interval

our local society that provide special care for elderly family members and care for their medicines and their adherence to medication.

The result of this study shows that there is a significant difference ( $P < 0.05$ ) between different level of education in terms of adherence. Patients have good adherence level are 35.5% with primary education, 9.7% have intermediate education, 29.0% high school graduates, 25.8% are college graduate and above. College graduates patients have significantly low adherence level compared to primary education. This result is inconsistent with results by other researchers. Shaimol *et al.*<sup>10</sup> found that graduated patients have high adherence level. Fadare *et al.*<sup>13</sup> found no significant difference ( $P > 0.05$ ) between different level of education regarding adherence. Arifulla *et al.*<sup>14</sup> also found no significant difference ( $P > 0.05$ ) between different levels of education in terms of adherence. Gelaw *et al.*<sup>15</sup> found similar results. Although it is expected that patients with higher level of education adhere better to their medication, the cause of these different results may be due to that adherence as an attitude it is linked to people different perceptions rather than their education level.

Furthermore, the results show that married patients have significantly ( $P < 0.05$ ) higher adherence state than non-married. This result is similar with what was reported by Gelaw *et al.*<sup>15</sup> where they found marital status significantly ( $P < 0.05$ ) increase adherence and also similar the results by Shams and Barakat<sup>16</sup> where they study 417 patients, they found that married patients showed significant ( $P < 0.05$ ) higher rate of therapeutic adherence (48.6%) than single, widowed, or divorced ones (21.9%). However, different results found by Khan *et al.*<sup>17</sup> studies show different results where they found no significant ( $P > 0.05$ ) impact of marital status on patient adherence. The finding that married more adhere to medication is logic because patients may have help, care, and support from a spouse and family.

In the current study, there is no significant difference ( $P > 0.05$ ) between number of drug regimen in terms of adherence. Similar results found in different studies. Donnan *et al.*<sup>18</sup> found significant ( $P < 0.05$ ) linear trends of poorer adherence with each increase in the daily number of tablets taken. Wabe *et al.*<sup>19</sup> studied 384 patients and also found multiple drug therapy in 75 (18.3%) of patients is one of the factors identified by patients as underpinning non-adherence.

This study shows that there is no significant difference ( $P > 0.05$ ) between smokers and non-smokers in terms of adherence. This result is inconsistent with the narrative review by Tikitin *et al.*<sup>20</sup> in which they review published articles in medline (31 December 2008 to 31 December 2013). This review concluded that medication adherence is influenced by complex and multifactorial issues, which include smoking. This difference in result may be due to the small number of smokers in this study.

Regarding factors contribute to non-adherence, there are three main factors may contribute to non-adherence to medication: Non-adherence to regular follow-up in diabetes clinic (odds ratio [OR] = 2.818, confidence interval [CI] = 1.697-4.682), non-adherence to healthy diet (OR = 2.823, CI = 1.676-4.756), and non-adherence to instruction to take medication (OR = 2.050, CI = 1.016-4.137). Similar results reported by another study by Khan *et al.*<sup>17</sup> in which they found the factors associated significantly with non-compliance are irregularity of follow-up (OR = 8.41, CI = 4.90-11.92) and non-adherence to drug prescription (OR = 4.55, CI = 3.54-5.56).

However, the same study<sup>17</sup> concluded that there is no significant difference ( $P > 0.05$ ) in terms of adherence to healthy diet with regard to adherence to oral hypoglycemic medications.

## Conclusion

Results obtained in this study can be summarized in the following points.

Majority of patients have low adherence scores, have duration of diabetes from 5 years or less, take more than three medications, have monthly income of 5000-10000 SR, and were nonsmokers.

There is no significant difference term of adherence between different disease duration, number of drug regimen, smokers, and non-smoker.

About half of the patients have comorbidities, and there is no significant difference between patients with or without comorbidities in term of adherence.

The most important factors contribute to non-adherence to medication are non-adherence to regular follow-up in diabetes clinic (OR = 2.818, CI = 1.697-4.682), non-adherence to healthy diet (OR = 2.823, CI = 1.676-4.756), and non-adherence to instruction to take medication (OR = 2.050, CI = 1.016-4.137).

Limitations of the study: The main limitations of the study are the relatively small sample size compared to the diabetes Type 2 population, and that the data collected using an online survey.

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