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Self-reported adherence to glucose lowering medications at a tertiary hospital in Ibadan, Nigeria.

. **TO Akande[1], JO Adeleye[2] and OS Michael[3]**

Department of Medicine, Endocrinology Unit[1], University College Hospital,
Departments of Medicine, Endocrinology Unit[2] and Pharmacology and Therapeutics,
Chemotherapy and Clinical Toxicology Unit[3], College of Medicine,
University of Ibadan, Ibadan, Nigeria

Abstract

Background: The effectiveness of drug therapies, especially in chronic illnesses, is directly dependent on adherence. Despite high rates of treatment failures in our community, drug adherence studies and interventions are scarce. This study evaluated self-reported adherence in patients receiving glucose-lowering drugs for diabetes and related this to glycemic control.

*Methods***:** A cross-sectional study of persons with diabetes attending the endocrinology clinic of a tertiary hospital in southwest Nigeria. Participants' adherence to therapy was assessed by self-reported adherence and compared to Morisky 8 adherence score (reference score). Fasting plasma glucose and glycated hemoglobin levels were determined.

Results: Average age of participants was 59.3 years, 92.2% had type 2 diabetes, the rest had type 1. The mean duration of diabetes was 7.9 ± 6.5 years. Fasting plasma glucose and glycated hemoglobin were below cut-off points (indicating good control) in 41.7% and 48.3% respectively. Self-reported adherence to medications was high, avearge, and low in 80.9%, 13.6%, and 5.5% respectively. Morisky 8 adherence scores for high, medium, and poor were 38.9%. 31.9% and 29.2% respectively. Mean plasma glucose and glycated hemoglobin were above reference glucose control ranges for all categories of adherence reported. There was no relationship between mean plasma glucose and glycated hemoglobin levels and adherence scores. Major factors that negatively affected adherence were financial constraints, unavailability of medications, and busyness.

Conclusion: The proportion of patients with good glycaemic control was below 50%. Self-reported adherence to glucose-lowering medications was found not to correlate with glycemic control.

Keywords: *Self-reported adherence, Diabetes, glucose, Nigeria*

Correspondence: Dr. T. O. Akande, Department of Medicine, University College Hospital, Ibadan, Nigeria. E-mail: fumlamde@yahoo.com

Résumé

Contexte : L'efficacité des thérapies médicamenteuses, en particulier dans les maladies chroniques, dépend directement de l'observance. Malgré des taux élevés d'échecs thérapeutiques dans notre communauté, les études et les interventions sur l'adhésion aux médicaments sont rares. Cette étude a évalué l'adhésion auto-déclarée chez les patients recevant des médicaments hypoglycémiants pour le diabète et l'a liée au contrôle glycémique.

Méthodes : Une étude transversale de personnes atteintes de diabète fréquentant la clinique d'endocrinologie d'un hôpital tertiaire dans le sud-ouest du Nigeria. L'adhésion des participants au traitement a été évaluée par l'adhésion autodéclarée et comparée au score d'adhésion de Morisky 8 (score de référence). La glycémie à jeun et les taux d'hémoglobine glyquée ont été déterminés.

Résultats : L'âge moyen des participants était de 59,3 ans, 92,2 % avaient un diabète de type 2, les autres avaient un diabète de type 1. La durée moyenne du diabète était de 7,9 ± 6,5 ans. La glycémie à jeun et l'hémoglobine glyquée étaient inférieures aux seuils (indiquant un bon contrôle) dans 41,7% et 48,3% respectivement. L'adhésion autodéclarée aux médicaments était élevée, moyenne et faible dans 80,9 %, 13,6 % et 5,5 % respectivement. Les scores d'adhésion Morisky 8 pour les niveaux élevé, moyen et faible étaient de 38,9 %. respectivement 31,9% et 29,2%. La glycémie plasmatique moyenne et l'hémoglobine glyquée étaient au-dessus des plages de contrôle glycémique de référence pour toutes les catégories d'adhésion rapportées. Il n'y avait aucune relation entre la glycémie plasmatique moyenne et les taux d'hémoglobine glyquée et les scores d'adhérence. Les principaux facteurs qui ont eu une incidence négative sur l'adhésion étaient les contraintes financières, l'indisponibilité des médicaments et l'occupation.

Conclusion : La proportion de patients ayant un bon contrôle glycémique était inférieure à 50 %. L'adhésion auto-déclarée aux médicaments hypoglycémiants s'est avérée non corrélée avec le contrôle glycémique.

Mots clés : *Adhésion autodéclarée, Diabète, glucose, Nigéria*

Introduction

Diabetes mellitus is a disease of public health significance worldwide [1]. It is a disease that has assumed pandemic proportions and prevalence is still on the increase. Worldwide, an estimated 425 million adults aged 20-79 years have diabetes and this estimate is projected to increase to 629 million by 2045 [2]. The effectiveness and success of medications depend significantly on patient's adherence to therapy. Adherence rates are typically higher among patients with acute conditions as compared with those with chronic conditions like diabetes [1]. Poor adherence to treatment of chronic diseases is a worldwide problem of disturbing magnitude. Adherence to long-term therapy for chronic illness in developed countries averages 50% and the rates in developing countries are even lower. Approximately 50% of Patients with type 2 diabetes do not achieve adequate glycaemic control and this is often related to poor adherence to medications [3].

The World Health Organization (WHO) defines adherence to long term therapy as "the extent to which a person's behaviour-taking medication, following diet and or executing lifestyle changes corresponds with agreed recommendations from a healthcare provider" [4]. Patients are adherent to drug therapy when they conform to the recommendations made by the healthcare provider with respect to timing, dosage and frequency of taking medications [4]. There are several methods of measuring adherence: some are direct like directly-observed therapy, measurement of level of medicine/metabolite in blood and indirect methods like patient self-reports, pill counts and use of patient diaries.

Inability to adhere to medications can be attributable to factors that include complexity of regimens, safety concerns, socioeconomic issues, ethnicity, patient education and beliefs, social support and poly-pharmacy [5, 6]. Poor understanding of factors that contribute to medication non-adherence continue to pose significant threat to continued efficacies of medicines and patient well-being. In addition, the problems that militate against patient compliance may include more culturally acceptable and sometimes cheaper complementary alternative medicines. These evidence-based interventions lead to improvements in patients' compliance to their medicines [7]. There is a need to assess the level of adherence and evaluate the factors contributing to medication non-adherence in our population of persons with diabetes. Identified factors can guide medical professionals in their efforts to increase the patient adherence to long term treatment regimens and enhance their efficacies.

Methodology

Study design and ethical considerations

This was a cross sectional study done using predesigned questionnaires at the Medical Outpatients' Department of the University College Hospital Ibadan, a tertiary hospital located in South-West Nigeria. The study protocol was approved by the University of Ibadan and the University College Hospital Health Review Committee (approval no UI/EC/14/0209). Informed consent was obtained from the participants before recruitment into the study. Recruitment was done between January and April 2014.

Study participants and procedures

Study participants were eligible if they were clinically stable, aged at least 18 years, diagnosed with diabetes for at least 6 months and on lifestyle therapy and medications. Patients with gestational diabetes were excluded. A convenience sampling method was used to recruit consecutive patients till the sample size was obtained. Each patient completed a structured questionnaire with a trained examiner who asked the questions and recorded the answers. Socio-demographic information included age, gender, educational status, current employment status, average monthly income. Clinical characteristics included co-morbid illnesses, name of medications and frequency of use. Detailed medical and medication history was obtained from enrolled patients.

Laboratory Assessment of glycemic control

Whole blood samples (5 mls in a heparinized vacutainer bottle) was obtained from the veins of each participant for estimation of fasting plasma glucose (FPG) (using a validated glucometer) and glycated hemoglobin (HbA1c) (HemoCue® HbA1c 501 System). For the study, glycemic level was calculated using cut-off points for FPG and HbA1c levels. Reference ranges for FPG and HbA1c were the same used in the tertiary hospital where the study was conducted and in conformance with global values. Cut off for FPG was 98 mg/dl (5.4mmol/l) while it was 7% for HbA1c. Participants who had FPG and HbA1c equal to or less than the cut off points were considered as having good glycemic control, while those with higher values were considered as having poor glycemic control.

Assessment of self-reported adherence

Medication adherence was assessed by self-report of adherence. Participants were asked to categorize their overall adherence to their glucose-lowering medications as either high, average or low. High was described as never missing a dose and adhering to prescribed regimen fastidiously, average described as occasionally missing medications (approximately three doses in a week), and low described as unable or not compliant and missing more than three doses per week. Not adherent at all was described as not taking prescribed glucose lowering medications. Participants were also asked to answer questions on

factors that may have negatively affected or encouraged adherence to their medications.

Self-adherence was compared to scores obtained by the validated Morisky 8-Item Medication Adherence Questionnaire [8], considered as the standard for the study. The Morisky questionnaire collects information on whether or not patients forget to take their medications and how they take their medications with 8 questions mostly requiring a Yes/ No response. Total scores on the Morisky-8 range from 0 to 8, with scores of 8 reflecting high adherence, 7 or 6 reflecting medium adherence and <6 reflecting low adherence.

Statistical and data analysis:
Sample size was calculated using the prevalence of diabetes mellitus at 4.3%, at desired level of precision of 0.05%, and a z value of 1.96 using the Leslie Kish formula [9]. This gave a minimum sample size of 61 participants required for the study. Data was analyzed using the statistical package for social sciences (SPSS 17.0). Simple proportions and Chi-square test were used for categorical variables. Averages and mean ± standard deviation were used to summarize continuous variables and categorical variables were presented in proportions. Means were compared using the student T-test. Statistical level of significance was set at a P-value less than 0.05.

Results

A total of 113 participants were studied, with 69% being female; average age of participants was 59.3 years. All participants were evaluated for adherence to glucose-lowering drugs by self-report and Morisky scale. Average

Table 1: Demographic and Socio-economic characteristics of respondents N=113

Variables	Frequency	Percentage (%)	Average for all groups
Gender			
Male	35	31.0	
Female	78	69.0	
Age (years)			
20-30	5	4.4	
31-40	6	5.3	
41-50	13	11.5	
51-60	26	23.0	59.3
61-70	42	37.2	
>71	21	18.6	
Employment status			
Employed	65	57.5	
Not employed	17	15.0	
Retired	31	27.5	
Occupation			
Civil servant	13	11.5	
Trader	38	33.6	
Artisan	13	11.5	
Cleric	1	0.9	
Retired	31	27.4	
Unemployed	17	15.0	
Monthly income(Naira)			
0	38	33.6	
<18,000	26	23.0	
>18,000-50,000	28	24.8	57,500 Naira
>50,000-100,000	13	11.5	
>100,000	8	7.1	
Marital status			
Married	81	71.7	
Divorced	2	1.8	
Separated	5	4.4	
Widowed	22	19.5	
Single (not married)	3	2.7	
Religion			
Christianity	76	67.3	
Islam	37	32.7	
Education			
None	19	16.8	
Primary	31	27.4	
Secondary	25	22.1	
Tertiary	38	33.7	
Living alone			
Yes	93	82.3	
No	20	17.7	

monthly income was 57,000 Naira / month. The demographic and socio-economic characteristics of respondents are shown in Table 1. Majority of the participants had type 2 diabetes (90.2%), mean duration of diabetes was 7.9 +6.5 years. All participants were on glucose lowering medications in addition to lifestyle modification.

Metformin, sulfonylurea, and insulin were the most prescribed drugs and we found that 31% of patients were on both metformin and sulphonylurea, 18.6% were on insulin alone while 17.7% were on metformin alone (table 2).

Respondent's adherence to anti-diabetic drugs showed that the greatest adherence was to sulfonylureas (88.9%) followed by metformin (85.2%), insulin (82.6%), pioglitazone (77.8%), DPPIV (66.7%), combination drugs (60.0%) Fasting plasma glucose (FPG) was evaluated in 96 participants (96/113, 84.5%), while HbA1c was done in 58 participants (58/113, 51.3%). Using cut-offs of <98mg/dl and <7.0 % for FPG and HbA1c, 41.7% and 48.3% of respondents had good glycemic control respectively (fig 1).

Self-reported adherence to medications was high, average and low in 80.9%, 13.6% and 5.5% respectively (Table 3). Assessment of adherence using the Morisky -8 showed high, average and low adherence in 38.9%, 31.9% and 29.2% respectively (Tables 3). Simple T test was used to compare the means of FPG and HbA1c between those that had high and low adherence (both self-reported and Morisky-8) and this was not statistically significant (p =0.099 and 0.488 respectively) (tables 4 &5). The commonest reasons claimed to be responsible for non-adherence to their glucose-lowering medications were unavailability of medications (14.2%), financial constraints (13.3%) and busyness (11.4%). Some of the participants' motivations for adherence were to stay alive and to remain healthy.

Table 2: Pattern of use of glucose lowering drugs among the study participants

Glucose lowering drugs	Frequency (N=113)	%
Metformin and Sulfonylurea	35	31.0
Insulin alone	21	18.6
Metformin alone	20	17.7
Metformin plus Insulin	13	11.5
Sulfonylurea alone	6	5.3
Metformin plus Sulfonylurea plus Pioglitazone	3	2.7
Metformin plus Sulfonylurea plus Insulin	2	1.8
Metformin plus Pioglitazone	1	0.9
Metformin plus DPP-IV	1	0.9
Insulin plus Pioglitazone plus DPP-IV	1	0.9
Sulfonylurea plus Pioglitazone plus DPP-IV	1	0.9
Sulfonylurea plus Insulin plus Pioglitazone plus DPP-IV	1	0.9
No response	8	7.1

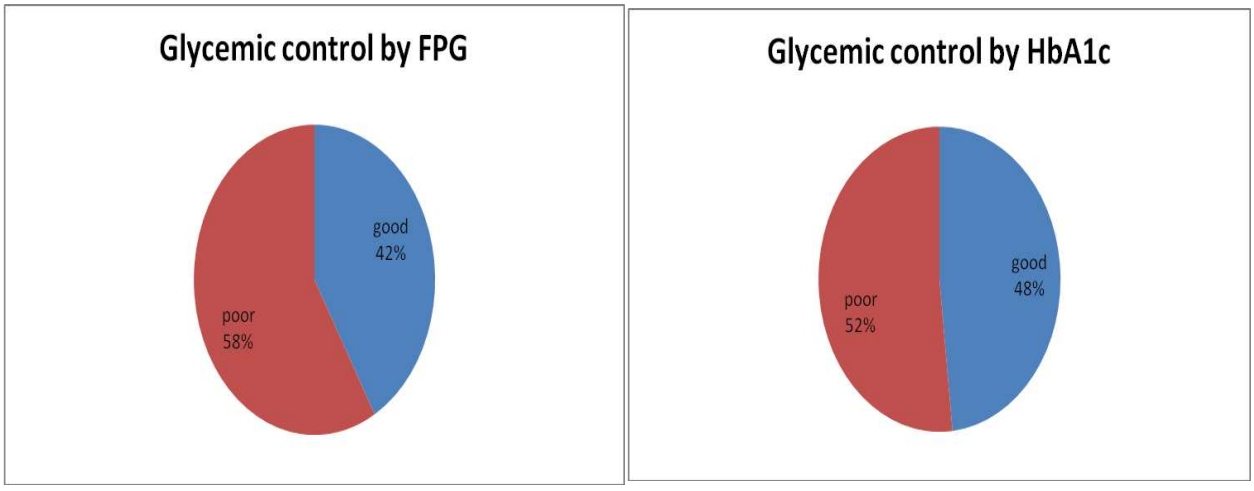

Fig. 1: Participants with good and poor glycemic control by the results of Fasting Plasma Glucose and HbA1c levels.

Table 3: Overall adherence to glucose lowering medications in study population by self-reported and Morisky-score

Adherence category	Self-reported n (%)	Morisky score n (%)
High	92 (80.9)	44 (38.9)
Average	15 (13.6)	36 (31.9)
Low	6 (5.5)	33 (29.2)

Table 4: Relationship between self-reported adherence and mean values of HbA1c / fasting glucose levels

Self-reported adherence	Fasting glucose, (mg/dl) *N=96 Mean ± SD	HbA1c (%) *N= 58 Mean ± SD
High	128.4 ± 65.9	7.2 ± 2.5
Average	117.0 ± 42.9	7.2 ± 3.9
Low	179.8 ± 80.4	8.2 ± 5.5

SD = standard deviation
**some did not have fasting glucose and HbA1c done*

Table 5: Adherence by Morisky score and mean values of fasting glucose and HbA1c levels in study participants

Morisky adherence	Fasting Glucose (mg/dl) *N=96Mean ± SD	HbA1c (%) *N=58Mean ± SD
High	130.2± 58.4	7.2±2.8
Average	127.8±76.6	6.3 ± 2.2
Low	130.5± 60.1	7.9 ± 3.4

SD = standard deviation
**some did not have fasting glucose and HbA1c done*

Discussion

Our study assessed self-reported adherence to glucose-lowering medications. We used 2 methods to assess adherence: a response to questions in which patients were asked to classify their adherence as either high, average or low (self-report) and also using the validated Morisky-8 questionnaire. We used both methods because in our diabetes clinic, the first method is routinely used to assess adherence and is fast while the second method is a standardized one. Although self-reports carry a potential risk of response-bias, they have been shown to provide a reasonably accurate estimate of adherence. In addition, they are cheap, brief and applicable in various settings.

The results showed that glycemic control by FPG and HbA1c was poor in majority of the study participants even though reports of adherence to therapy by the participants indicated that the majority (80.9%) reported high adherence. But with the Morisky- 8 item scale, adherence was high in only 38.9% of respondents. Adherence by Morisky score was average in 31.9% and low in 29.9%. Earlier studies which were also done in south-West Nigeria in persons with diabetes showed that 60% were adherent to medications (the 4- item medication adherence scale was used) while in another study, adherence by Morisky-8 score was good, moderate and poor in 40.6%, 32.8 % and 26.6% respectively (10, 11). In a study in Saudi Arabia, adherence by Morisky-8 was high, intermediate and low in 35.7%, 42.9% and 21.4% respectively [12] while Abebe SM et al in Ethiopia the self-reported adherence to diabetic medication was high, medium and low in 45.9%. 28.7% and 25.4% respectively [13].

The proportion of low-adherence using the more reliable Morisky score found in our study was comparable with that of several other studies conducted in Sub-saharan Africa [13 – 15]. Studies in several countries have shown low adherence among persons with diabetes and persons with other chronic medical conditions [14]. In a systematic

review, the prevalence of adherence ranged from 38.5% to 93.1% and only in 22 (2%) of the studies was adherence e" 80% among the study population [16]. Though there is no consensual standard for what constitutes adequate adherence, some trials consider rates of greater than 80% to be acceptable [17].

Our study highlights the limitations of using quick self-reported adherence, as there was a discrepancy between this and Morisky-8 score, with the self-report showing much higher adherence. Many reasons may be responsible for this, including recall bias and the patients intentionally giving falsified responses of exaggerated good adherence due to fear of being reprimanded by health practitioners for poor adherence. Cost implications of prescribed therapies may also be contributory. Adherence to sulphonylureas was highest and this could be due to the fact that it is one of the cheapest glucose-lowering medications in our environment and is readily available. Adherence to insulin was also very good even though many patients with type 2 diabetes initially declined commencement of insulin.

Using the self- reported adherence classification, mean glycated haemoglobin was higher in the group with low adherence compared to high adherence (8.2 ± 5.5 and 7.2± 2.5 respectively) , whilst using the MMAS-8, mean glycated haemoglobin was also higher in the group with poor adherence compared to the group with high adherence(7.9 ± 3.4 and 7.2±2.8 respectively) though this did not attain statistical significance. Several studies have reported the beneficial effect of adherence on glycaemic control [18]. Our study was limited by a small sample size, this could be the reason for statistical non-significance in the between category comparisons of mean blood glucose and HbA1c levels (in category analyses of good, fair, and poor adherence).

The WHO has identified non-adherence as a multifactorial problem caused by the interplay of factors from any of these 5 areas: the patient, the condition, the type of therapy prescribed, socioeconomic factors and health-system related factors [19]. In our study, respondents gave several reasons for non- adherence, the commonest being financial constraints and unavailability of drugs. In our setting, most patients pay out of pocket for medications as very few have health insurance and this has been found to be challenging for patients. Further studies are required to elucidate the factors contributing to poor adherence and to design appropriate interventions that will mitigate them and improve adherence in our local population of patients with diabetes.

Conclusion

Glycemic control was good in 41.7% and 48.3% of respondents using FPG and HbA1c respectively. Self-reported adherence to glucose-lowering medications was inconsistent with blood glucose levels and the reference adherence score. There is a need to conduct studies aimed at developing appropriate methods of assessing adherence to glucose lowering medications and implementing effective interventions that will enhance adherence. Healthcare professionals should aim at improving medication adherence in their practice by designing interventions to help with non-adherence which include availability of medications at hospital pharmacies.

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