Scientific
Research
Publishing

Factors Affecting Medication Non Adherence in Type 2 Sudanese Diabetic Patients

Tarig Mohammed EI-Hadiyah[1], Abdelhaleem Mustafa Madani[2], Hisham Mohammed Abdelrahim[3], Abubakr Khidir Yousif[4*]

[1]Departement of Pharmacology, Faculty of Pharmacy, University of Khartoum, Khartoum, Sudan
[2]Clinical Pharmacist, Drug Information and Poisons Centre, Omdurman Teaching Hospital, Omdurman, Sudan
[3]Departement of Medicine, Faculty of Medicine, University of National Ribat, Khartoum, Sudan
[4]Continuous Professional Development Directorate, Ministry of Health, Wadmadani, Sudan
Email: [*]abubarkhidir@hotmail.com

Abstract

Background: Medications non-adherence is responsible for treatment failure and a reason of higher cost of medical care. It had been proved that, in general, diabetic patients are non-adherent to their treatment and only a small number of them were found to be adhering with all aspects of diabetic care. Objectives: To assess and evaluate the most common factors associated with medications adherence among Type 2 Diabetes Mellitus (DM) patients attending Ribat University Hospital Diabetic Clinic (RUHDC) Khartoum state, Sudan. Methods: Single Centre Descriptive cross sectional hospital based study was carried out among 351 patients using structured questionnaire and patients cards. Results: A total of 351 patients were recruited in the study; 65.8% were females. About 64.4% were on oral medications and 35.6% on insulin. Adherence to medications among total Type 2 DM patients was 45%. Main barriers to medication adherence were drugs unavailability (34.3%) and forgetfulness (30.7%). Medications knowledge was 41.2% for patients on oral medications and 38.4% for insulin users. Conclusion: Adherence to anti-diabetic drugs in this study was found to be sub-optimal but considered reasonable in comparison with that reported by many African countries. Poor medications knowledge, drug brand unavailability and forgetfulness were the main reasons for medications non adherence. Family support, improving healthcare system and changing patents' behavior will be needed to improve medications adherence.

Keywords

---

[*]Corresponding author.

1. Introduction

Treatment of Type 2 Diabetes Mellitus (DM) is complex, cost-effective and requires recommendations that are tailored to fit with person's needs, culture and educational level [1] [2]. Medications adherence, life style modifications and specialized multidisciplinary team are the cardinal keys of diabetes management. Medication adherence is defined as "the extent to which the patient takes his medications as prescribed" and this prescription should be based on agreement between the patient and his medical provider [3]. Medications non-adherence is responsible for failure to attain positive clinical outcomes [4]-[7] and a reason of higher cost of medical care [3]. On the other hand, each 25% improvement in adherent associated with reduction in HbA1c level and mortality rate [8]. It has been proved that, in general, diabetic patients are non-adherent to their treatment and only a small numbers of diabetic patients have been found adherent with all aspects of diabetic care [9]. The reasons for poor adherence are multifaceted and complex, and include, Patient-centered factors (such as age, sex, education, and forgetfulness), therapy-related factors (such as treatment complexity and side effects), healthcare system factors (such as drug availability and accessibility to healthcare), social and economic factors (such as cost of therapy, income and social support) [10]-[12]. In Sudan 77% were found to be uncontrolled due to cost related factors [13].

2. Methods

A cross-sectional study was carried out at RUHDC. Ribat University Hospital is one of the biggest Teaching hospitals in Sudan. In addition to medical services to patients, the hospital renders service of teaching and research to many universities students and medical researchers. The questionnaire content was properly constructed from updated literature regarded diabetes medications adherence and validated by discussion with experts in diabetes management and medical research. Patients at first informed about the objectives of this study and then ten copies of a multiple-choice questionnaire were piloted among randomly selected Type 2 DM patients. After minor changes, the questionnaire distributed directly to patients attending to RUHDC during August 2012 and February 2013 at the study site, whilst patients' cards were also used to check or obtain some patients data. Newly diagnosed patients were taking medication less than 3 months were excluded. All 351 Type 2 DM patients taking medications for 3 months or more were enrolled in this study after obtaining full permission from researches authorities at Ribat University. Patients were interviewed face to face and asked "If they were taking their medications regularly" and also asked about "the exact time of medication use" Also information including socio-demographic characteristic and main reasons of medications non-adherence were obtained. Data were analyzed, using social package for social science (SPSS) version 16, to assess patient's answers. Descriptive and chi-square statistics were used. The values were considered to be significant at $P \leq 0.05$.

3. Results

From a total of 398 DM patients visited RUHDC, about 351 (88.2%) were Type 2 DM. About 226 (64.4%) were on oral therapy and 125 (35.6%) on insulin regimen (**Figure 1**). Female constituted 231 (65.8%) and old ages above 60 years were 170 (48.4 %.) House wife were 197 (56.1%), patients had insurance coverage 294 (83.8%), illiterate 74 (21.1%), and 155 (44.16%) attained only basic educational level (**Table 1**). Medications adherence among total Type 2 DM (**Figure 2**) was 158 (45%). Adherence was higher (**Table 1**) among female 102 (64.6%), patients above 60 years old 80 (50.6%) and patients attained basic educational level 72 (45.5%). Drug unavailability 87 (34.3%), forgetfulness 78 (30.7%) were the main reasons of non-adherence, whilst drug cost was only 31(12.2%) (**Figure 3**). Medications adherence was 100 (44.2%) for patients on oral medications and 57 (45.6%) for insulin users (**Table 2**). Patients' knowledge about specific time of medications use was 93 (41.2%) for patients on oral medications and 48 (38.4%) for insulin users (**Table 2**).

4. Discussion

Medications adherence rates are low, among Type 2 DM patients, in both developed and developing countries. World health organization (WHO) stated that, adherence among patients suffering chronic diseases averages only 50% in developed countries and estimated to be much less in developing countries [3]. A report from USA during the period 1999 to 2006 proved that adherence was very low [14]. Medications adherence was low in our study and this result is slightly less than that carried in some developing countries, like ours, such as Ethiopia
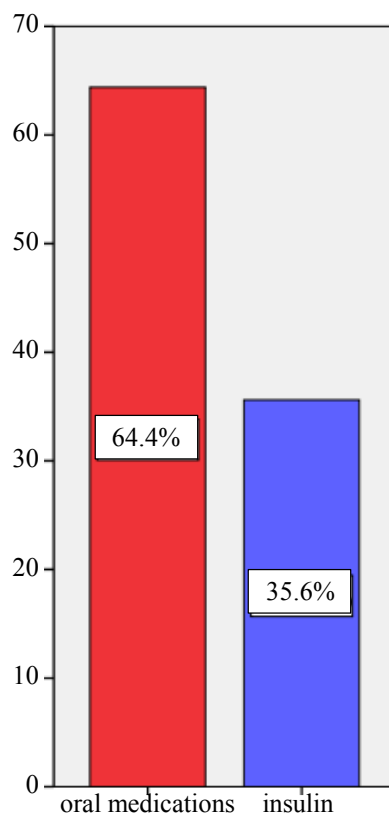
Figure 1. Patients' classification according to type of Medications.

(51.3%) [15], and better than that done in Nigeria (40.1%) [16] and Egypt (38.9%) [17]. Many studies revealed a difference in adherence between patients on oral medications and those on insulin. In retrospective studies, adherence was 62% and 64% for long-term and new-start insulin users, respectively [18]. On the other hand Guillausseau P-J Y. *et al.* study found that only 46% were adherent to oral medications [19], whilst Rozenfeld Y. *et al.* study reported 81% for patients who had recently initiated oral therapy [20]. In this study there was no significant adherence difference between patients on insulin or oral medications users. Many studies reported association between socio-demographic characteristics and adherence. Rasaq Adisa *et al.* [21] found female and professional with tertiary education were more adherent to their medications. Mohamed *et al.* study [17] from Egypt reported higher adherence was among, female (although not significant), younger and educated patients. Although high percent of adherence was among female, low education and older patients in our study, but we think we cannot give judge on the effect of age and sex because there was significant high difference in number of female and older age in our sample. However we agreed with effect of education because medications knowledge, in general, among our patients was poor. Numerous studies found significant relation between poor adherence and financial problems. Study in USA showed that 34% of patients stated that paying for medications was a reason for the lack of adherence [22]. Yusuff *et al.* study in Nigeria [16] and Nasir *et al.* study in Ethiopia [15] specified lack of finance as major barrier for anti diabetic drug adherence; which institute 51.9% and 37.1% respectively. In our study drugs brand unavailability and forgetfulness were major barriers for medications adherence. Whilst financial reason as barrier in this study was weak (12.2%) and this because (83.8%) of our patients had insurance coverage. However insurance offer drug according to generic name, so sometimes many patients may stop their treatment for few days till they find the specific brand that they commonly use.

5. Conclusion

Adherence to anti-diabetic drugs in our study was found to be sub-optimal but considered reasonable when compared with that reported by many countries surrounding Sudan. Poor medications knowledge, drug brand unavailability and forgetfulness were the main reasons for medications non adherence. Family support and

Table 1. Socio demographic characteristics in relation to adherence.

| Demographic		Patients' adherence N (%)		Total	P-value
		Adherent N (%)	Non-adherent N (%)		
		(N = 158)	(N = 193)	(N = 351)	
Gender					
	Male	56 (35.4)	64 (33.2)	120 (34.2)	0.368
	Female	102 (64.6)	129 (66.8)	231 (65.8)	
Age					
	20 - 40	40 (25.3)	46 (23.8)	86 (24.5)	0.512
	41 - 60	38 (24.1)	57 (29.5)	95 (27.1)	
	Above 60	80 (50.6)	90 (46.7)	170 (48.4)	
Educational level					
	Illiterate	32 (20.3)	42 (21.8)	74 (21.1)	0.795
	Non-formal	8 (5.1)	6 (3.1)	14 (3.9)	
	Basic	72 (45.5)	83 (43)	155 (44.16)	
	High secondary	25 (15.8)	34 (17.6)	59 (16.8)	
	University	21 (13.2)	28 (14.5)	499 (13.9)	
Occupation					
	Officer	19 (12.0)	30 (15.5)	49 (14.0)	0.274
	laborer	7 (4.4)	11 (5.7)	18 (5.1)	
	Non-working	8 (5.1)	4 (2.1)	12 (3.4)	
	House wife	92 (58.2)	105 (54.4)	197 (56.1)	
	Retired	30 (19.0)	35 (18.1)	65 (18.5)	
	Others	2 (1.3)	8 (4.1)	10 (2.8)	
Insurance					
	Have Insurance	129 (81.6)	165 (85.5)	294 (83.8)	0.204
	Have not insurance	29 (18.4)	28 (14.5)	57 (16.2)	
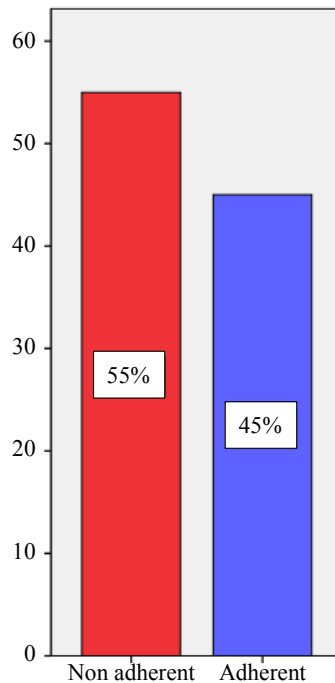
Figure 2. Type 2DM total medications adherence.
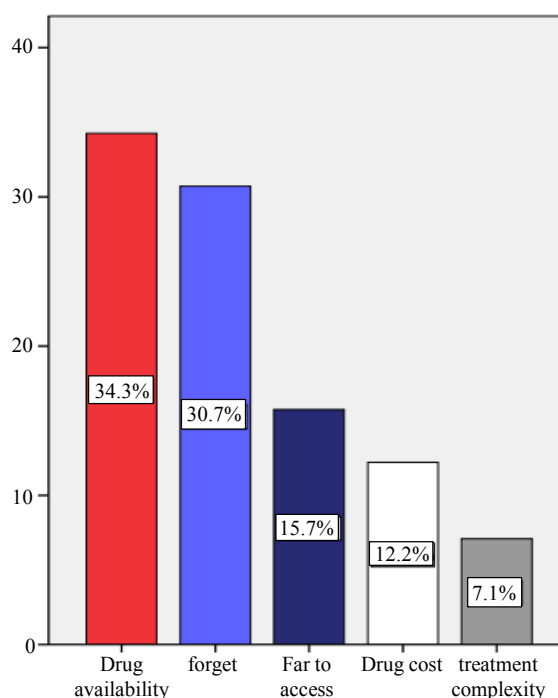
Figure 3. Main Reasons for medications non adherence.

Table 2. Comparison between Types of Medications in respect to adherence and knowledge.

Comparison		Insulin user's N (%)	Oral medications N (%)
Adherence		N = 125	N = 226
	-Adherent	57 (45.6)	100 (44.2)
	-Non adherent	68 (54.4)	126 (55.8)
Medications knowledge			
	Poor knowledge	77 (61.6)	133 (58.8)
	Good knowledge	48 (38.4)	93 (41.2)

psychological, together with patients education, interventions will change patients' behavior and improve adherence. Medical providers, mainly pharmacist, should inform patients that experiences in Sudan prove that the therapeutic effect of all anti-diabetic drug brands is accepted.

6. Limitation

Although Ribat University Hospital is one of the biggest hospitals in Sudan, conducting this study in single centre will not give the complete picture about medication non adherence among type 2 DM in Sudan as a whole. So generalized study funded by considerable organization or research institute is urgently recommended. Data were obtained by self-report questionnaire which may over estimated adherence, so further studies are recommended by using more accurate methods such as electronic measurement to assess medication adherence.

Acknowledgements

We would like to express our gratitude to the RUHDC: workers, doctors for their fine dealing during the period of data collection, and also thank for our respondents for their active participation.

Conflict of Interest

None.

References

[1] Inzucchi, S.E., *et al.* (2012) Management of Hyperglycemia in Type 2 Diabetes: A Patient-Centered Approach: Position Statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*, **35**, 1364-1379. http://dx.doi.org/10.2337/dc12-0413

[2] (2016) Standards of Medical Care in Diabetes-2016: Summary of Revisions. *Diabetes Care*, **39**, S4-S5. http://dx.doi.org/10.2337/dc16-S003

[3] WHO (2003) Adherence to Long-Term Therapies Evidence for Action.

[4] Vermeire, E., *et al.* (2005) Interventions for Improving Adherence to Treatment Recommendations in People with Type 2 Diabetes Mellitus. *Cochrane Database of Systematic Reviews*, **2**, Article ID: CD003638. http://dx.doi.org/10.1002/14651858.cd003638.pub2

[5] Ose, D., Miksch, A., Urban, E., Natanzon, I., Szecsenyi, J., Kunz, C.U. and Freund, T. (2011) Health Related Quality of Life and Comorbidity. A Descriptive Analysis Comparing EQ-5D Dimensions of Patients in the German Disease Management Program for Type 2 Diabetes and Patients in Routine Care. *BMC Health Services Research*, **11**, 179. http://dx.doi.org/10.1186/1472-6963-11-179

[6] The Diabetes Control and Complications Trial Research Group (1993) The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long-Term Complications in Insulin-Dependent Diabetes Mellitus. *The New England Journal of Medicine*, **329**, 977-986. http://dx.doi.org/10.1056/NEJM199309303291401

[7] Farsaei, S., *et al.* (2011) Effect of Pharmacist-Led Patient Education on Glycemic Control of Type 2 Diabetics: A Randomized Controlled Trial. *Journal of Research in Medical Sciences*, **16**, 43-49.

[8] Ho, P.M., Rumsfeld, J.S., Masoudi, F.A., McClure, D.L., Plomondon, M.E., Steiner, J.F. and Magid, D.J. (2006) Effect of Medication Non-Adherence on Hospitalization and Mortality among Patients with Diabetes Mellitus. *Archives of Internal Medicine*, **166**, 1836-1841. http://dx.doi.org/10.1001/archinte.166.17.1836

[9] Chatterjee, J.S. (2006) From Compliance to Concordance in Diabetes. *Journal of Medical Ethics*, **32**, 507-510. http://dx.doi.org/10.1136/jme.2005.012138

[10] Rubin, R.R. (2005) Adherence to Pharmacologic Therapy in Patients with Type 2 Diabetes Mellitus. *The American Journal of Medicine*, **118**, 27S-34S. http://dx.doi.org/10.1016/j.amjmed.2005.04.012

[11] Horton, E.S. (2008) Can Newer Therapies Delay the Progression of Type 2 Diabetes Mellitus? *Endocrine Practice*, **14**, 625-638. http://dx.doi.org/10.4158/EP.14.5.625

[12] Kurlander, J.E., *et al.* (2009) Cost-Related Non-Adherence to Medications among Patients with Diabetes and Chronic Pain: Factors beyond Finances. *Diabetes Care*, **32**, 2143-2148. http://dx.doi.org/10.2337/dc09-1059

[13] Elrayah-Eliadarous, H., Yassin, K., Eltom, M., Abdelrahman, S., Wahlström, R. and Östenson, C.-G. (2010) Direct Costs for Care and Glycaemic Control in Patients with Type 2 Diabetes in Sudan. *Experimental and Clinical Endocrinology & Diabetes*, **118**, 220-225. http://dx.doi.org/10.1055/s-0029-1246216

[14] Cheung, B.M., *et al.* (2009) Diabetes Prevalence and Therapeutic Target Achievement in the United States, 1999 to 2006. *The American Journal of Medicine*, **122**, 443-453. http://dx.doi.org/10.1016/j.amjmed.2008.09.047

[15] Wabe, N.T., Angamo, M.T. and Hussein, S. (2011) Medication Adherence in Diabetes Mellitus and Self Management Practices among Type-2 Diabetics in Ethiopia. *North American Journal of Medicine & Science*, **3**, 418-423. http://dx.doi.org/10.4297/najms.2011.3418

[16] Yusuff, K.B., Obe, O. and Joseph, B.Y. (2008) Adherence to Anti-Diabetic Drug Therapy and Self Management Practices among Type-2 Diabetics in Nigeria. *Pharmacy World and Science*, **30**, 876-883. http://dx.doi.org/10.1007/s11096-008-9243-2

[17] Shams, M.E. and Barakat, E.A. (2010) Measuring the Rate of Therapeutic Adherence among Outpatients with T2DM in Egypt. *Saudi Pharmaceutical Journal*, **18**, 225-232. http://dx.doi.org/10.1016/j.jsps.2010.07.004

[18] Cramer, J.A. (2004) A Systematic Review of Adherence with Medications for Diabetes. *Diabetes Care*, **27**, 1218-1224. http://dx.doi.org/10.2337/diacare.27.5.1218

[19] Guillausseau, P.J. (2003) Influence of Oral Anti-Diabetic Drugs Compliance on Metabolic Control in Type 2 Diabetes. A Survey in General Practice. *Diabetes & Metabolism*, **29**, 79-81. http://dx.doi.org/10.1016/S1262-3636(07)70011-3

[20] Rozenfeld, Y., *et al.* (2008) Oral Anti-Diabetic Medication Adherence and Glycemic Control in Managed Care. *The American Journal of Managed Care*, **14**, 71-75.

[21] Adisa, R., Alutundu, M.B. and Fakeye, T.O. (2009) Factors Contributing to Non-Adherence to Oral Hypoglycemic Medications among Ambulatory Type 2 Diabetes Patients in Southwestern Nigeria. *Pharmacy Practice* (*Granada*), **7**, 163-169. http://dx.doi.org/10.4321/S1886-36552009000300006

[22] Odegard, P.S. and Gray, S.L. (2008) Barriers to Medication Adherence in Poorly Controlled Diabetes Mellitus. *The Diabetes Educator*, **34**, 692-697. http://dx.doi.org/10.1177/0145721708320558