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Medication adherence and glycemic control in newly diagnosed diabetic patients

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ABSTRACT

Optimal glycaemic control is enhanced through medication adherence, leading to better short and long prognosis, we aimed to study the adherence levels for patients with diabetes to their medications. Medication adherence was assessed using the Morisky score for adherence to medication, participants Patients aged ≥ 18 years with diabetes who visited the Center once or more during a three-month period. Fasting plasma glucose was 192 ± 84.4 mg/dL at baseline and 149 ± 56.1 mg/dl after three months, and the HbA1c was $9 \pm 2.2\%$ at baseline and $8.4 \pm 2\%$ after three months. Medication adherence was: high (34.4%), medium (42.5%), and low (23.1%), age are significantly associated with medication adherence. Medication adherence was high in 34.4%, medium in 42.5%, and low in 23.1%, indicating that most of the patient have adequate medication adherence to diabetic therapy, an age of the patients appear to the only factor associated with adherence.



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INTRODUCTION

Diabetes mellitus still one of the more growing global health problems. A chronic disease like that, if stay for a long time without controlling lead to microvascular and macrovascular complications, which are the main causes of increased morbidity and mortality, decreased health-related quality of life among patients and increasing and the huge economic burden on national health care systems in the worldwide. (Pousinho *et al.*, 2016, Fadare *et al.*, 2015) Physicians have the impression that diabetes is a large-scale problem in the Iraqi population. There is an expected 54% worldwide increase

in DM prevalence in the next 20 years (Zimmet *et al.*, 2014).

Many studies in the Middle East has been done and have many results, one of these results was to appreciate the potential seriousness of diabetes, its complications, or early detection signs and patient medication adherence. (Alsairafi *et al.*, 2016, Al-Kaabi *et al.*, 2008, Alizzi *et al.*, 2018) Adherence refers to "the extent to which a person's behaviour: taking medication, eating a suitable diet, and executing lifestyle changes correspond with agreed recommendations from a health care provider". Other study presents a model that associated with medication adherence among type II diabetic Mellitus (T2DM) patients, with disease-related knowledge as a significant predictor of likely adherence. (Al-Kasab *et al.*, 1979)

We aimed to investigate adherence levels to oral hypoglycemic agents (OHAs) and insulin in patients with diabetes in outpatients setting at the National Diabetes Center.

MATERIALS AND METHODS

The study carried out in the medical outpatient diabetes clinic at the National Diabetes Center, from

Oct 2016 till Dec 2016, the study approved by Research Ethics Committee of the Diabetes Center before the commencement of the study following to Helsinki declaration for human studies. Two hundred and ninety-nine consecutive patients diagnosed with type II DM (ICD-10: E11) recruited to participate in the study, inclusion criteria included: age above 18 years, newly diagnosed patients, six months duration of therapy.

The adherence tool (the eight-item Morisky Medication Adherence Scale (MMAS-8)) (Morisky *et al.*, 2008) was used. The scoring summary for adherence was 0 (high), 1 – 2 (medium), >2 (poor), in addition, basic clinical characteristics were collected.

The average of 2 recent visits of fasting plasma sugar (FBS) and HbA1c used as an indicator of glycaemic control, other laboratory parameters collected from patients include renal function test, lipid panel profile.

Statistical Analysis

Data described as either as the mean \pm standard deviation (for normally distributed data), or number (percentage) for categorical variables, chi-square or Fisher exact test used for categorical groups analysis. All analysis carried out using IBM SPSS version 19 (IBM Corporation, Armonk, NY, USA) and the p-value of < 0.05 were considered significant.

RESULTS

FBG at baseline and after three months of the patients was (192 ± 84.4 and 149 ± 56.1 mg/dL respectively) while for HbA1c it was ($9 \pm 2.2\%$ and $8.4 \pm 2\%$ respectively). The Oral hypoglycaemic agent was prescribed for 212 (70.9%) of patients while insulin was prescribed for 24 (8%) of the patient. Insulin & OHA prescribed in 58 (19.4%) of the patient and the patients who still without medication (on a diet) were 5 (1.7%). The distribution of medication adherence was: 103 high (34.4%), 127 medium (42.5%), and 69 low (23.1%) as illustrated in Table 2. FBG, HbA1c, cholesterol, triglyceride, HDL, and LDL were significantly improved after the second visit, as illustrated in table 3. Only age-associated significantly with adherence levels as illustrated in table 4.

DISCUSSION

Adherence to antidiabetes medications stills a significant challenge to prevent complications of this disease in many developing countries. Non-adherence to medication, Poor drug adherence is the most important cause for uncontrolled DM, preventable complications, and loss of healthcare resources. (Khan *et al.*, 2012) The results of the current study described the prescribing pattern of an-

tidiabetic drugs and patient's adherence to medication. Male patients constitute the largest ratio of patients in the study; which similar to another study (Sicras-Mainar *et al.*, 2014). The mean age of 57.59 ± 10.96 years which is similar to other studies with 58.15 ± 9.16 years and 61 ± 12.3 years recorded in work from other countries. (Al-Qazaz *et al.*, 2011, Mafauzy, 2006)

Achieving and keeping good glyceic control (fasting plasma glucose FPG ≥ 126 mg/dL (7.0 mmol/L)) is the goal of pharmacotherapy among diabetes patients, (Association, 2018, Janghorbani and Amini, 2011) though this is not possible in a 39.8 % of our study and 20.1 % of the study participants had good level of glycated haemoglobin A1c, an indicator of glyceic control, which is in agreement with two Nigerian studies. (Shrestha *et al.*, 2015, Adisa *et al.*, 2011) 29.9% HbA1c had acceptable limits which are parallel to the result in another Iraqi study and others. (Shrestha *et al.*, 2015, Al-Mukhtar *et al.*, 2012, Asche *et al.*, 2011)

About 70.9% of the patients prescribed oral hypoglycemic agent this is close to Yusuff *et al.*, in which OHA prescribed in 86% of the patients (Yusuff *et al.*, 2008), in another study 91% of the patients prescribed OHA. (Al-Mukhtar *et al.*, 2012)

In the current study medication adherence were good in 34.4 %, moderate in 42.5% and poor in 23.1% and this results are closely related to Kavitha *et al.*, were 28%, 42% and 30% for high, medium and poor adherence level respectively (S. *et al.*, 2017), which is also in agreement with Jamons *et al.*, with only 16.9% of patients had poor adherence, (Jamous *et al.*, 2011) while Abebe *et al.*, observed a 45.9% high adherence, 28.7% medium adherence and 25.4% low adherence, respectively. (Abebe *et al.*, 2014) The most important causes of uncontrolled diabetes are poor adherence to medications, which is lead to insufficient glycaemic control, increased utilization of health care resources and increase mortality rates. (DiBonaventura *et al.*, 2014, Egede *et al.*, 2014) Medication adherence associated with an increase in physician visits and managing type 2 DM complications. (Egede *et al.*, 2014, DiBonaventura *et al.*, 2014, Roebuck *et al.*, 2011) Approximately 150 (50.2%) of the cases were trained to take care of their feet and thus closely related to Manal *et al.*, who have said that 58.2% Of the cases have taken care about their feet. (Murad *et al.*, 2014).

CONCLUSION

Medication adherence was high in 34.4%, medium in 42.5%, and low in 23.1%, indicating that most of the patient have adequate medication adherence to diabetic therapy, the age of the patients appear to the only factor associated with adherence.

Table 1: Sociodemographic data of study participants (n=299)

Variables	Details	Value
Age (years), number (%)	≤ 30	1 (0.3%)
	31-45	43 (14.4%)
	46-60	119 (39.8%)
	> 60	136 (45.5%)
Sex, number (%)	Male	160
	Female	139
	Male: female ratio	1.15:1
Duration of DM (years), number (%)	< 5	94 (31.4%)
	5-10	110 (36.8%)
	> 10	95 (31.8%)
Education, number (%)	Illiterate	9 (3.0%)
	Primary	36 (12.0%)
	Secondary	68 (22.7%)
	College	186 (62.2%)
Occupation, number (%)	Housewife	121 (40.5%)
	Free work	40 (13.4%)
	Retired	58 (19.4%)
	Employee	76 (25.4%)
	Others	4 (1.3%)
Body mass index (kg/m ²), number (%)	Underweight (<18)	3 (1.0)
	Normal (18-24.9)	39 (13.0)
	Overweight (25-29.9)	114 (38.1%)
	Obese (≥30)	143 (47.8%)

Table 2: Pattern of drugs prescribed to individual study participants

Variables	Details	Value
Hypertension, number (%)	Yes	58 (19.4%)
	No	241 (80.6%)
Normal blood pressure, fasting blood sugar, HbA1c%, number (%)	Yes	4 (1.3%)
	No	295 (98.7%)
Diabetes Medication, number (%)	No Medication	5 (1.7%)
	OHA	212 (70.9%)
	Insulin	24 (8.0%)
	OHA & Insulin	58 (19.4%)
Antihypertensive Medications, number (%)	None	243 (81.3%)
	ACEI	24 (8.0%)
	ARB	6 (2.0%)
	BB	8 (2.7%)
	CCB	0 (0%)
	Combined Rx	18 (6.0%)
	Yes	6 (2.0%)
Antiplatelets, number (%)	No	293 (98.0%)
	Yes	6 (2.0%)
Statins, number (%)	Yes	80 (26.8%)
	No	219 (73.2%)
Fibrate, number (%)	Yes	9 (3.0%)
	No	290 (97.0%)
Adherence, number (%)	0	103 (34.4%)
	1-2	127 (42.5%)
	> 2	69 (23.1%)

OHA: oral hypoglycemic agents, ACEI: angiotensin-converting enzyme inhibitor, ARB: angiotensin receptor blocker, CCB: calcium channel blocker; Patient adherence score (more than two low adherence, 1-2 = medium adherence, 0= high adherence).

Table 3: Comparison between first and second reading after three months

Parameter	Level	1st visit	2nd visit	P value
FPG (mg/dl), number (%)	Good (<110)	20 (6.7%)	49 (16.4%)	<0.001
	Fair (110-160)	75 (25.1%)	131 (43.8%)	[Sig.]
	Bad (>160)	204 (68.2%)	119 (39.8%)	
HbA1c %, number (%)	Good (<7)	50 (16.7%)	60 (20.1%)	<0.001
	Acceptable (7-8)	60 (20.1%)	102 (34.1%)	[Sig.]
	Poor (>8)	189 (63.2%)	137 (45.8%)	
Cholesterol (mg/dl), number (%)	Normal (<200)	202 (67.6%)	243 (81.3%)	<0.001
	High	97 (32.4%)	56 (18.7%)	[Sig.]
Triglyceride (mg/dl), number (%)	Normal (<150)	189 (63.2%)	227 (75.9%)	0.001 [Sig.]
	High	110 (36.8%)	72 (24.1%)	
HDL (mg/dl), number (%)	Normal (40 – 60)	245 (81.9%)	264 (88.3%)	0.038 [Sig.]
	Low	54 (18.9%)	35 (11.7%)	
LDL (mg/dl), number (%)	Normal (<100)	133 (44.5%)	167 (55.9%)	0.007 [Sig.]
	High	166 (55.5%)	132 (44.1%)	

Sig.: significant

Table 4: Comparison of some parameters according to the adherence

Variables	Level	Adherence level			P value
		Poor (N=103)	Medium (N=127)	High (N=69)	
Age (year)	≤ 30	0 (0.0%)	1 (0.8%)	0 (0.0%)	<0.001 [Sig.]
	31-45	33 (32.0%)	8 (6.3%)	2 (2.9%)	
	46-60	41 (39.8%)	37 (29.1%)	41 (59.4%)	
	> 60	29 (28.2%)	81 (63.8%)	26 (37.7%)	
Sex	Females	45 (43.7%)	57 (44.9%)	37 (53.6%)	0.393
	Males	58 (56.3%)	70 (55.1%)	32 (46.4%)	
Education	Illiterate	4 (3.9%)	4 (3.1%)	1 (1.4%)	0.622
	Primary	11 (10.7%)	15 (11.8%)	10 (14.5%)	
	Secondary	18 (17.5%)	31 (24.4%)	19 (27.5%)	
	College	70 (68.0%)	77 (60.6%)	39 (56.5%)	
FPG (mg/dl)	Good (<110)	6 (5.8%)	7 (5.5%)	7 (10.1%)	0.422
	Elevated (≥110)	97 (94.2%)	120 (94.5%)	62 (89.9%)	
HbA1c %	Normal (<7)	16 (15.5%)	25 (19.7%)	9 (13.0%)	0.455
	Elevated (≥7)	87 (84.5%)	102 (80.3%)	60 (87.0%)	

Sig.: significant

Conflict of Interest

None

REFERENCES

- ABEBE, S. M., BERHANE, Y. & WORKU, A. 2014. Barriers to diabetes medication adherence in North West Ethiopia. *Springerplus*, 3, 195.
- ADISA, R., FAKEYE, T. O. & FASANMADE, A. 2011. Medication adherence among ambulatory patients with type 2 diabetes in a tertiary healthcare setting in southwestern Nigeria. *Pharmacy Practice*, 9, 72.
- AL-KAABI, J., AL-MASKARI, F., SAADI, H., AFANDI, B., PARKER, H. & NAGELKERKE, N. 2008. Assessment of Dietary Practice Among Diabetic Patients in the United Arab Emirates. *The Review of Diabetic Studies: RDS*, 5, 110-115.
- AL-KASAB, F. M. K., ALKAFAJEI, A. M. B. & MED-BIGH, S. H. 1979. The Prevalence of Diabetes Mellitus in a Rural Community in Iraq. *International Journal of Epidemiology*, 8, 69-71.
- AL-MUKHTAR, S. B., FADHIL, N. N. & HANNA, B. E. 2012. General and gender characteristics of type 2 diabetes mellitus among the younger and older age groups. *Oman medical journal*, 27, 375.
- AL-QAZAZ, H. K., SULAIMAN, S. A., HASSALI, M. A., SHAFIE, A. A., SUNDRAM, S., AL-NURI, R. & SALEEM, F. 2011. Diabetes knowledge, medication adherence and glycemic control among patients with type 2 diabetes. *International journal of clinical pharmacy*, 33, 1028-1035.
- ALIZZI, F. J., ABBAS, W. A. J. A. & FAWZI, H. A. 2018. Assessment of the role of cholecystokinin in hyperemesis gravidarum and correlation with its severity. *J. Pharm. Sci. & Res.*, 10, 272-275.
- ALSAIRAFI, Z. K., TAYLOR, K. M. G., SMITH, F. J. & ALATTAR, A. T. 2016. Patients' management of

- type 2 diabetes in Middle Eastern countries: a review of studies. *Patient preference and adherence*, 10, 1051-1062.
- ASCHE, C., LAFLEUR, J. & CONNER, C. 2011. A review of diabetes treatment adherence and the association with clinical and economic outcomes. *Clinical Therapeutics*, 33, 74-109.
- ASSOCIATION, A. D. 2018. Classification and Diagnosis of Diabetes: &em> Standards of Medical Care in Diabetes—2018 Jan. *Diabetes Care*, 41, S13-S27.
- DIBONAVENTURA, M., WINFIELD, N., HUANG, J. & GOREN, A. 2014. The association between non-adherence and glycated haemoglobin among type 2 diabetes patients using basal insulin analogues. *Patient preference and adherence*, 8, 873-882.
- EGEDE, L. E., GEBREGZIABHER, M., ECHOLS, C. & LYNCH, C. P. 2014. Longitudinal Effects of Medication Nonadherence on Glycemic Control. *Annals of Pharmacotherapy*, 48, 562-570.
- FADARE, J., OLAMOYEGUN, M. & GBADEGESIN, B. 2015. Medication adherence and direct treatment cost among diabetes patients attending a tertiary healthcare facility in Ogbomosho, Nigeria. *Malawi medical journal*, 27, 65-70.
- JAMOUS, R. M., SWEILEH, W. M., ABU-TAHA, A. S., SAWALHA, A. F., SA'ED, H. Z. & MORISKY, D. E. 2011. Adherence and satisfaction with oral hypoglycemic medications: a pilot study in Palestine. *International journal of clinical pharmacy*, 33, 942-948.
- JANGHORBANI, M. & AMINI, M. 2011. Normal fasting plasma glucose and risk of prediabetes and type 2 diabetes: the Isfahan Diabetes Prevention Study. *The review of diabetic studies: RDS*, 8, 490.
- KHAN, A. R., LATEEF, Z. N. A.-A., AL AITHAN, M. A., BU-KHAMSEEN, M. A., AL IBRAHIM, I. & KHAN, S. A. 2012. Factors contributing to non-compliance among people with diabetes attending primary health centres in the Al Hasa district of Saudi Arabia. *Journal of Family and Community Medicine*, 19, 26.
- MAFAUZY, M. 2006. Diabetes control and complications in public hospitals in Malaysia. *Medical Journal of Malaysia*, 61, 477.
- MORISKY, D. E., ANG, A., KROUSEL-WOOD, M. & WARD, H. J. 2008. Predictive validity of a medication adherence measure in an outpatient setting. *The Journal of Clinical Hypertension*, 10, 348-354.
- MURAD, M. A., ABDUL MAJEED, S. S., IFTIKHAR, R. & SAGGA, B. K. 2014. Assessment of the Common Risk Factors Associated with Type 2 Diabetes Mellitus in Jeddah. *International Journal of Endocrinology*, 2014, 9.
- PAULINHO, S., MORGADO, M., FALCÃO, A. & ALVES, G. 2016. Pharmacist interventions in the management of type 2 diabetes mellitus: a systematic review of randomised controlled trials. *Journal of managed care & speciality pharmacy*, 22, 493-515.
- ROEBUCK, M. C., LIBERMAN, J. N., GEMMILL-TOYAMA, M. & BRENNAN, T. A. 2011. Medication Adherence Leads To Lower Health Care Use And Costs Despite Increased Drug Spending. *Health Affairs*, 30, 91-99.
- S., K., G. K., N., R. M., S., G. N., S., P., D. & NAGARAL, J. V. 2017. Treatment adherence and factors contributing to non-adherence among type 2 diabetes mellitus patients in a tertiary care hospital: a cross-sectional study. 2017, 6, 6.
- SHRESTHA, S. S., SHAKYA, R., KARMACHARYA, B. & THAPA, P. 2015. Medication adherence to oral hypoglycemic agents among type II diabetic patients and their clinical outcomes with special reference to fasting blood glucose and glycosylated haemoglobin levels. *Kathmandu University Medical Journal*, 11, 226-232.
- SICRAS-MAINAR, A., NAVARRO-ARTIEDA, R. & IBANEZ-NOLLA, J. 2014. Clinical and economic characteristics associated with type 2 diabetes. *Revista Clínica Española (English Edition)*, 214, 121-130.
- YUSUFF, K. B., OBE, O. & JOSEPH, B. Y. 2008. Adherence to anti-diabetic drug therapy and self-management practices among people with type-2 diabetes in Nigeria. *Pharmacy World & Science*, 30, 876-883.
- ZIMMET, P. Z., MAGLIANO, D. J., HERMAN, W. H. & SHAW, J. E. 2014. Diabetes: a 21st century challenge. *Lancet Diabetes Endocrinol*, 2, 56-64.