July 2013, Vol. 7, No. 7, pp. 760-765
Journal of Life Sciences, ISSN 1934-7391, USA

Meeting the ADA Guidelines of Diabetic Care at King Fahd Hospital of University, Khobar, Eastern Province, Saudi Arabia in 2012

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Received: April 07, 2013 / Accepted: June 14, 2013 / Published: July 30, 2013.

Abstract: The main purpose of this study is determining the extent of achieving American Diabetes Association (ADA) targets in diabetes type I and II at KFUH (King Fahd Hospital of University) in the year of 2012. Observational, cross sectional, retrospective study was conducted on 479 patients; the informations were reviewed using Quadramed CPR system. All the data obtainedwere analyzed by medical statistician using SPSS program. The results show that only 19.0% was achieved the target of HbA_{1c}; and the targets of LDL, HDL and TG were achieved in 38.4%, 35.9%, and 48.2% respectively. The routine ophthalmology and dietitian review were found to be in only 32.1% and 27.3%, respectively. The use of medications recommended by ADA was 51.4% for aspirin and 54.7 % for both statin and ACE inhibitor. The present study indicated that most of the ADA guidelines were not achieved in our diabetic patients being followed in our center, which is almost similar to other studies in most of the parameters. The achievement of diabetes targets is a difficult task but may not be impossible. It requires a multidisciplinary approach. So, further studies are needed to determine the reasons behind the gap between practice and guidelines.

Key words: Diabetes, HbA_{1c}, LDL-C, ACEI, ophthalmology visit.

1. Introduction

Diabetes mellitus is the most common chronic endocrine disorder. It is one of the leading causes of death in most high income countries as it causes heart disease, stroke, lower limb amputation and blindness. The International Diabetes Federation (IDF) estimated that 366 million people have diabetes in 2011, which is around 8.3% of the world's adult population; by 2030 this will have risen to 552 million. The number of people with type II diabetes is increasing in every country, with 80% lives in low and middle-income countries; 183 million people (50%) with diabetes are undiagnosed. It caused 4.6 million deaths in 2011. Type 1 diabetes develops in 78,000 children every year [1].

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Saudi Arabia has the second highest rate of diabetes in middle east and seventh highest in the world, according to World Health Organization (WHO). The prevalence of diabetes in the Kingdom was reported in one study to be 34.1% in males and 27.6% in females, which represents a major clinical and public health problem [2]. It was considered in some studies as epidemic and was expected to double by the year 2030. The mortality rate secondary to cardiovascular disease and diabetes was reported by WHO in the kingdom to be 401 per 100,000 populations in ages 30-70 years [3].

United Kingdom Prospective Diabetes Study (UKPDS) showed that retinopathy, nephropathy, and possibly neuropathy are benefited by lowering blood glucose levels in type 2 diabetes with intensive therapy, which achieved a median HbA_{1c} of 7.0% compared with conventional therapy with a median HbA_{1c} of 7.9%. The

overall microvascular complication rate was decreased by 25%. These results materially increase the evidence that hyperglycemia causes, or is the major contributor, to these complications. Epidemiological analysis of the UKPDS data showed a continuous relationship between the risks of microvascular complications and glycemia, such that for every percentage point decrease in HbA_{1c} (e.g. 9 to 8%), there was a 35% reduction in the risk of complications. Similar association was shown between the risk of cardiovascular complications and glycemia, such that for every percentage point decrease in HbA_{1c} (e.g. 9 to 8%), there was a 25% reduction in diabetes-related deaths, a 7% reduction in all-cause mortality, and an 18% reduction in combined fatal and nonfatal myocardial infarction [4].

Results from clinical trials over the past decade have led to national and international guidelines that advocate aggressive management of hyperglycemia, hypertension and dyslipidemia for patients with diabetes.

Despite many guidelines, patients with diabetes continue to suffer from high rates of complications and can expect life span reduction of 10-15 years [5, 6]. This inability to effectively translate clinical evidence into practice represents a major barrier to reducing the burden of this disease.

Thus, this study was undertaken to determine the extent of achieving American Diabetes Association (ADA) targets in patients with diabetes attending diabetic clinic in our tertiary care center.

2. Materials and Methods

This observational, cross sectional, retrospective study was conducted on patients attending diabetic clinic at King Fahd Hospital of University, Khobar, Eastern Province, Saudi Arabia.

A list of patients of either gender of both types of diabetes attending diabetic clinic in the year of 2012 were prepared. Their information were reviewed using Quadramed CPR system which included age, gender, dietitian and ophthalmology visits, biochemical profile (levels of HbA_{1c}, creatinine, microalbumin and lipid profile in terms of LDL-C, TG and HDL-C).Medications profile was also reviewed which included Aspirin, Statin and Angiotensin Converting Enzyme Inhibitors (ACEI).

Unfortunately, Blood Pressure and Body mass index could not be analyzed because they were not computerized in our system.

All the data obtained were analyzed by medical statistician using SPSS program to find out the number and percentage of patients achieving ADA targets. For the purpose of analysis, only the last laboratory values were used to reflect the effect of long-term treatment.

3. Results

The total numbers of patients visit king Fahd Hospital of the University as outpatients were 737 patients of diabetes (485, 252 for type II and type I respectively). Out of these, 479 patients fulfilled the criterion that is at least two visits during 2012 and were included. The Table 1 illustrates that is 67.4% had Type II diabetes while 32.6% had Type I diabetes (323 and 156 respectively). Regarding Type I diabetic patients, 31% of them had been diagnosed for more than 5 years compared to 69% with recent diagnosis (48 patients and 108 patients respectively). The age range of the study sample was from 2 to 85 years, with the mean age being 42.81 (SD 19.96). Regarding the Gender, 274 of the sample were females (57.2%) in comparison to 205 male patients (42.8%).

Table 2 illustrates the Goals of ADA, and according to that all patient included to analyze HbA_{1c}, fasting lipid profile and Dietitian visit data. However, just 371 of them (type I diabetes with duration of < 5 years were excluded) had been included to analyze Serum Microalbumineuria and ophthalmology visit data, and only 403 of them (all diabetes patients less than 18 years old were excluded) had been included to analyze the serum creatinine data. Unfortunately, Blood pressure was not analyzed because it was not computerized in our system.

Table 1 Patient characteristics.

	Type of diabetes		Gender		Duration of DMI		Age of all DM
	DMI	DMII	Male	Female	≥ 5 years	< 5 years	
Numbers	156	323	205	274	48	108	-
Percentages (%)	32.6	67.4	42.8	57.2	31	69	-
Range (Mean)							2-85 (42.81)

Table 2 ADA guidelines targets 2012.

Parameters	ADA targets	
A1c	To be checked at least twice annually	< 7 %
Fasting lipid profile	In most adult patients, measured at least annually. In adults with low-risk lipid values lipid assessments may be repeated every 2 years.	LDL < 100 HDL > 50 in Females HDL > 40 in Males TG < 150
Creatinine	At least annually in all adults with diabetes.	
Urine albumin excretion	All type 2 diabetic patients starting at diagnosis and Type 1 diabetic patients with diabetes duration of ≥5 years should be measured annually	
Ophthalmology visit	All type 2 diabetic patients starting at diagnosis and type 1 diabetic patients with diabetes duration of ≥5 years should visit ophthalmologist annually	
Blood Pressure	Blood pressure should be measured at every routine diabetes visit.	SBP < 130 mmHg DBP < 80 mmHg

The ADA quality care standards showed wide variation in their implementation as Table 3 shows, some processes were completed for more than half of the patients, such as HbA_{1c} testing at least twice yearly, fasting lipid profile and creatinine measurement at least once yearly (94.4%, 72.0%, 83.6%) respectively. Conversely, other process indicators were done for less than half of the patients, such as micro albuminuria; ophthalmology visit and dietitian visit (25.1%, 32.1%, 27.3%) respectively.

As in Standards of Medical Care in Diabetes-2012 to Lower A1c to below or around 7%, among all diabetic patients at our hospital was only 19.0 % achieved that goal. And according to each type separately, type II achieved more that type I (22.0%, 12.8%) respectively. And it is almost the same in achieving the goal regarding to the gender.

And as in ADA standards, fasting lipid profile in most adults patients should be measured at least annually but in adults with low-risk lipid values lipid assessments may be repeated every 2 years. Out of 72.0 % that fasting lipid profile had been done for them in 2012, almost half of them achieved the goal and the other half were not for LDL and HDL (38.4 and 35.9%) respectively; which is better achieving in female than male in diabetestype II however, the same indiabetes type I. But for TG the patients that achieved are doubling that are not achieved (48.2% and 24.6%) respectively, which is almost the same in males and females in both types.

Table 3 Performance on quality indicators.

Process indicators	Completed	
	Numbers (Total)	Percentage (%)
HbA_{1c}	452 (479)	94.4
Fasting lipid profile	352 (479)	72.0
Serum creatinnine	337 (403)	83.6
Microalbumineuria	93 (371)	25.1
Ophthalmology visit	119 (371)	32.1
Dietitian visit	131 (479)	27.3

The number and percentage of our patients (both diabetes type I and II) in the study on recommended antihypertensive, anti-platelet and statin medication were 216 (45.1%), 233 (48.6%), 216 (45.1%) respectively as shown in Fig. 1.

4. Discussion

Despite the strong evidence that intensive glycemic control reduces complications of diabetes and many treatment strategies available currently in addition to many guidelines for management of diabetes, our study have shown that majority of patients followed

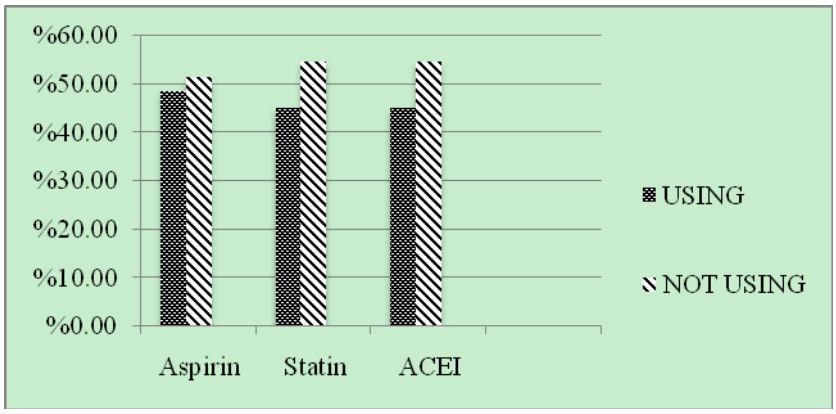

Fig. 1 Medication used by the diabetic patients (both type I and II).

Table 5 Comparison of ADA target achievement in selected studies.

Study, Year, Reference	Population	Sample Size	Setting	% with target HbA_{1c} (< 7%)	% with target LDL-C (< 100 mg/dL)	% Microalbuminuria test
Current study	DM1, DM2	479	Diabetec clinic-teaching hospital	19%	38.4%	25.1%
[7] Riyadh, KAMC, KSA, 2006	DM2	1,188	Internal medicine clinic-tertiary care hospital	21.8%	55%	26%
[8] Riyadh, KKUH, KSA, 2001-2003	DM2	99	PC clinics-Teaching hospital	24.7%	NR	11.3% 1st year 1% 2nd year 16.7% 3rd year
[9] Jeddah, KAUH, KSA, 2007	DM2	1,107	Internal medicine and Diabetec clinics-university hospital	24%	50.5%	NR
[10] AL-Kharj and Riyadh, KSA, 2012	DM2	543	Military primary care	10.4%	27.6%	21%
[11] * Riyadh, KAMC, KSA, 2006-2007	DM2	100	Internal medicine clinic – Tertiary care hospital	18%	51%	NR
[11]*Grimbsy,UK,2006-2007	DM2	100	General hospital	35%	75%	NR
[12] US academic medical centers, 2000-2002	DM1, DM2	1,765	PC-diabetes ,endocrinology clinics	34%	46.1%	NR
[13] Ilorin, Nigeria, 2008	DM2	500	Tertiary care facility	36%	NR	NR

up in our clinics were not achieving ADA targets.

As it is shown in Table 5, previous similar studies in the Kingdom have shown almost similar results with highest achieved HbA_{1c} target was 24.7% in KKUH in Riyadh for diabetes type II only. [8] Our study showed only 19% achieved this target, however, included both diabetes type II and I. In comparison with other studies in US [12], UK [11], Nigeria [13], they achieved higher target with 34%, 35% and 36% respectively.

In UKPD study, despite intensive therapy used which is not currently possible for routine care of diabetes only 50 % achieved a goal of HbA_{1c} of 7% [14] and after nine years only 25 % of obese candidates maintained this level of HbA_{1c} [15].

Our study lacks the information regarding diabetes type I, presence of complications and duration of diabetes since the information were taken from our electronic records which can all contribute to poor control of diabetes in our patients.

Another important metabolic target in diabetic patient is the lipid profile primarily LDL-C which was done in majority of our patients but the study lack the information of how frequent it was done. The targets LDL-C, HDL-C, TG, were achieved in 38.4%, 35.9%, and 48% respectively. In other studies, it was reported as high as 75% in UK study [11] and as low as 27.6% in military primary care centers study [10] as illustrated in Table 5.

As a predictor of diabetic nephropathy,

microalbumin test is recommended by ADA guidelines, which was found in our study that only 25 % were tested for it which was better than what was reported to be as low as 11% in another study from primary care clinics in Riyadh [8]. In another study from medical university of South Carolina [16] which found that patients who could derive the greatest benefit from testing (i.e., those without preexisting proteinuria or who were not receiving an angiotensin-blocking drug) were no more likely to be screened for microalbuminuria than those with existing proteinuria (16% vs. 18%, $P = 0.84$) or those who were already being treated with an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker (16% vs. 16%, $P = 0.83$).

The routine ophthalmology, dietitian visit review which should be offered to all diabetic patients were found to be in only 32.1%, 27.3% respectively which were less in comparison with Riyadh study [8] (KKUH primary clinics) which reported annual ophthalmology visits up to 80% in first year of the study and 56.6% in all 3 years of the study.

The Use of medications recommended by ADA in our diabetic patients for prevention of complications were 51.4% for Aspirin and 54.7% for both Statin and ACE inhibitor which was less than what was reported from Riyadh Study [7] as 61.0%, 71.5%, 72.3% for ACEI or ARB or both, antiplatelet and Statin respectively. In the study of Medical university of South Calorina [16] they found that when the microalbuminuria test result was positive, only 40% of the patients were placed on angiotensin-blocking drugs. In a Canadian study [17] of diabetes with or without atherosclerotic complications, fewer than 25% received antiplatelet or statin and fewer than 50% received ACEI.

5. Conclusion

Our study indicated that most of the ADA guidelines were not achieved in our diabetic patients being followed in our center, which was almost similar to other studies in most of the parameters. The achievement of diabetes targets is a difficult task but may not be impossible. It requires a multidisciplinary approach. So, further studies are needed to determine the reasons behind the gap between practice and guidelines.

Acknowledgment

We thankfully appreciate AbrarAlMahfoodh, AmalAlMarhoon, NarjesAlSihati and Raja AlAbdrabalnabi, medical students, Dammam University, Saudi Arabia, for collecting the data from CPR system and all their great support.

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