

# Does the tertiary health care for Type 2 diabetic patients can help to Meet the recommended glycemetic targets

Tawfeeq F. R. AL-Auqbi M.B, Ch.B FICMS \*Ahmed A. A. AL-Sabbagh M.B, Ch.B FICMS  
\*Aufaira Shaker D.M.T B. Sc M. Sc \*Noor tha'ir Tahir Al-Khalidy B. Sc M. Sc

## Abstract

**Objectives:** To study the effect of providing tertiary (specialized) health care for type 2 diabetic patients to meet the WHO and ADA standards and glycemetic targets.

**Method:** Six months, Jan. – Jun. 2010, cohort study was conducted on 600 adult diabetics who registered in the National Diabetes Center (NDC) / Al-Mustansiriya University, Baghdad – Iraq. They were followed for 3-6 months; each time patients were examined physically and their blood pressure, height, weight and BMI were measured. Fasting blood samples were taken from all patients to test the FPG, HbA<sub>1c</sub>, T.Chol, TG, HDL and LDL.

**Results:** Patients' age was 52.85±15.56 year and the male/female ratio was 1.01, the median duration of disease was 7 years and their BMI was 28.80 ± 13.02 kg/m<sup>2</sup>. Patients' achievement during study period, of glycemetic and cardiovascular risk factors, meet the targets of ADA, NHANES and NCEP/ATP III Guidelines of FPG, PPG, HbA<sub>1c</sub>, T.Chol, TG, LDL, HDL, systolic and diastolic blood pressure by 26.74%,

29.09%, 32.78%, 61.0%, 60.86%, 76.19%, 74.35%, 52.54% and 62.50% respectively.

**Conclusions:** We concluded that tertiary health service can help to meet the international guidelines and recommended targets for type 2 diabetes. Improving quality and coverage of tertiary health services may help in achieve and sustain targets; and afterward close adhering to the WHO and ADA standards and glycemetic targets.

**Abbreviations:** BMI=Body Mass Index, FPG= Fasting Plasma Glucose, PPG = post prandial plasma glucose, HbA<sub>1c</sub> =glycated hemoglobin, T.Chol. = total cholesterol, TG = Triglyceride, LDL = low-density lipoprotein, HDL = high-density lipoprotein, ADA= American Diabetes Association, NHANES = National Health and Nutrition Examination Survey, NCEP/ATP III = National Cholesterol Education Program/Adult Treatment Panel III.

**Key words:** Tertiary health care, Type 2diabetes mellitus, glycemetic standards and targets

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## Introduction

The prevalence of diabetes has reached epidemic proportions. The World Health Organization (WHO) predicts that developing countries will bear the brunt of this epidemic in the 21st century. Currently, more than 70% of people with diabetes live in low- and middle income countries. An estimated 285 million people, corresponding to 6.4% of the world's adult population, will live with diabetes in 2010. The number is expected to grow to 438 million by 2030, corresponding to 7.8% of the adult population. <sup>(1, 2)</sup>

Diabetes affects approximately 24.5 million people in Middle East & North Africa (MENA), a region that contains six of the ten countries with the highest prevalence figures worldwide; and with a diabetes population that is set to double by 2025. <sup>(3)</sup> These six countries include the United Arab Emirates, which has the second-highest diabetes rate in the world, followed by Bahrain, Egypt, Kuwait, Oman, and Saudi Arabia. According to the

International Diabetes Foundation, an estimated 26.6 million adults in the Middle East and North Africa have diabetes, accounting for 9.3 percent of the world's diabetes cases in adults. <sup>(4)</sup>

Prevalence of Iraqi adults with diabetes mellitus, in 2006, was rapidly increasing reach 10.4%, and impaired blood glucose evidence was 15.7%. <sup>(5)</sup>

Results from clinical trials, UK Prospective Diabetes Study (UKPDS) Group, over the past decade have led to national and international guidelines that advocate aggressive management of hyperglycemia, hypertension, and dyslipidemia for patients with type 2 Diabetes Mellitus. <sup>(6)</sup> Despite many guidelines, patients with diabetes continue to suffer from high rates of cardiovascular and microvascular complications and can expect a lifespan reduction of 10-15 years. <sup>(7)</sup> In practice, diabetic patients hardly adopting guidelines and achieving the recommended targets which

would sustain and raise the burden of diabetes and its complications.

Although, achieving highest attainable standard of physical and mental health for everyone was clarified by The 1948 Universal Declaration of Human Rights,<sup>(8)</sup> in Iraq there is extensive data and many studies were conducted on various aspects of type 2 Diabetes Mellitus, but knowledge about meeting the WHO and American Diabetes Association (ADA) targets in management of diabetic patients was inadequate.

### **Objectives**

To study the effect of providing tertiary (specialized) health care for type 2 diabetic patients to meet the WHO and ADA standards and glycemic targets.

### **Methods**

#### **Ethical approval**

All the medical research ethics rules and instructions adopted in National Diabetes Center (NDC) regarding patient's privacy, humanity and security; as well as the clinical notes, laboratory data and investigation results were strictly considered throughout all the steps of study.

#### **Setting**

Six months period (Jan. – Jun. 2010), cross-sectional and follow up study was conducted on adult patients who registered in the National Diabetes Center (NDC) / Al-Mustansiriya University, Baghdad – Iraq.

#### **Patients**

Total number of patients during the study period was 600 adult diabetic patients from Baghdad city; they attend the National Diabetes Center, which is a tertiary health care and research center, seeking tertiary (specialized) health care service. Patients were receiving diabetic treatment from private clinics or primary health care centers and other sources of medical service before attending to the National Diabetes Center (NDC). Then they were followed customarily according to the dating and advice, after registration, for 3-6 months by at least two visits during the study period. The diabetic patients were selected and diagnosed according to the

criteria of the World Health Organization/ Diabetes mellitus: Report of the WHO Study Group (1985)<sup>(9)</sup> and the ADA expert committee on the diagnosis and classification of diabetes mellitus (1997) and its follow up report (Feb. 2004).<sup>(10)</sup> Patients were routinely interviewed and examined during the period of study by consultant physicians according to the standard medical and laboratory work up which adopted in the center. Each time patients were examined physically, their blood pressure, height, weight and BMI were measured.

#### **Laboratory Analysis**

Fasting blood samples were taken from all patients during their visits for laboratory analysis to measure the fasting plasma glucose (FPG), glycated hemoglobin (HbA<sub>1c</sub>), lipid profile including total cholesterol (T.Chol.), Triglyceride (TG), high-density lipoprotein (HDL) and low-density lipoprotein (LDL).

#### **Statistical Analysis**

Statistical analysis and reporting of obtained data were carried out by using Microsoft Excel - Windows XP professional program. Statistical tests were performed using a null hypothesis of no difference with a two-tails student t-test and; the P values were  $\leq 0.05$  for the levels of significance, high significance.

### **Results**

#### **Characteristics**

The total number of patients, newly registered, enrolled and followed up during the study period was 600 adult diabetic patients. Patients' age was  $52.85 \pm 15.56$  year and the male/female ratio was 1.01, the median duration of disease was 7 years and their BMI was  $28.80 \pm 13.02$  kg/m<sup>2</sup>.

#### **Screening Tests**

Patients' parameters used to assess glycemic control and cardiovascular disease risk factors showed some improvement during study period between the first visit (before getting the tertiary health care) and last visit (after 3-6 months of getting tertiary health care). (Table -1)

Patients achievement, of glycemic and cardiovascular risk factors, meet the targets of

American Diabetes Association (ADA), National Health And Nutrition Examination Survey (NHANES) and National Cholesterol Education Program/Adult Treatment Panel III (NCEP/ATP III) Guidelines of fasting plasma glucose (FPG), post prandial plasma glucose (PPG), glycated hemoglobin (HbA<sub>1c</sub>), lipid profile including total cholesterol (T.Chol.), Triglyceride (TG), low-density lipoprotein (LDL), high-density lipoprotein (HDL), systolic and diastolic blood pressure by 26.74%, 29.09%, 32.78%, 61.0%, 60.86%, 76.19%, 74.35%, 52.54% and 62.50% respectively. (Tables -1, 2)

### **Discussion**

There is a strong evidence that intensive control of cardiovascular risk factors reduces morbidity and mortality in diabetes, our study revealed that 32.78% were meeting the recommended ADA glycemic targets of HbA<sub>1c</sub> <7%. Only 52.54% and 62.50% of study population were meeting the systolic and diastolic blood pressure targets which recommended by the National Cholesterol Education Program/Adult Treatment Panel III (ATP III) Guidelines (NCEP/ATP III) and National Health And Nutrition Examination Survey (NHANES III), Blood pressure <130/80 mmHg.<sup>(10, 11, 12)</sup>

We try to follow and compare our study to the international published studies,<sup>(12, 13)</sup> in addition to, three studies from Arab Middle East region, two from Saudi Arabia Mubashar et. al. (2010), Eledrisi et. al. (2007) and third one Akel (1999) from Lebanon.<sup>(14, 15, 16)</sup> The current study in Iraq is a trial to report on how the physicians and patients in a single tertiary care center adhere and achieve the guidelines standard and glycemic goals for the management of type 2 DM; we try to audit the tertiary health care via the achievement of targets. Achievements gained during our study of FPG, HbA<sub>1c</sub> and both systolic and diastolic blood pressure was superior to those previously reported by the similar studies from Middle East region.<sup>(14, 15, 16)</sup> (Tables 2)

A comparison of achievement gained in HbA<sub>1c</sub> and blood pressure targets in our study with other Studies<sup>(12, 13, 14, 15, 16)</sup> was giving an

idea about the resistance and difficulty to meet these targets, table - 2, despite the difference in setting of studies and impact of the cultural and standards of health care. Also we noticed that most of the studies were achieving nearly the same results. In the United Kingdom Prospective Diabetes Study (UKPDS),<sup>(17)</sup> HbA<sub>1c</sub> of 7.0% was achieved in only 50% of patients; thus, even with intensive treatment approach, 50% were unable to reach this target. Therefore, it is not surprising that only 32.78% of our study population had an HbA<sub>1c</sub> < 7%; our results illustrate that, despite the currently available therapies and tertiary health service, there was about three quarters of patients fail to reach recommended treatment targets. Practically, we appreciate the suggestions to modify and individualize recommended targets for our patients which may be more appropriate.<sup>(18)</sup>

### **Conclusions**

We concluded from our study about the tertiary health service provided to the type 2 diabetic patients in the National Diabetes Center / Al-Mustansiriyah University that tertiary health care can help to meet the international guidelines and recommended targets for type 2 diabetes.

Improving quality and coverage of tertiary health services may help in achieve and sustain targets; and afterward close adhering to the WHO and ADA standards and glycemic targets.

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\* National Diabetes Center (NDC), AL-Mustansiryia University, Baghdad - IRAQ.

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**Table 1: Patient checked parameters in the first and last visit during the study.**

parameters	First visit (Mean±SD)	Last visit, after 3- 6 months (Mean±SD)	Achievement of targets (%)	Glycemic standards and targets
FPG (mmol/l) (mg/dl)	12.14±5.09 220.75±92.70	8.44±3.23 153.59±58.83	26.74	≤ 5.0 – 7.2* ≤ 90 – 130*
PPG (mmol/l) (mg/dl)	14.82±4.86 269.63±88.51	11.54±3.73 209.96±67.99	29.09	≤10.0* ≤ 180*
HbA1c (%) (mmol/l)	9.78±2.65	7.16±1.35	32.78	≤7.0*
Total cholesterol (mmol/l) (mg/dl)	5.10±1.16 196.40±44.70	4.91±1.05 189.36±40.76	61.0	<5.2 <200†
Triglycerides (mmol/l) (mg/dl)	1.70±0.84 155.20±76.53	1.72±0.87 157.0±79.45	60.86	<1.65 <150†
LDL-C (mmol/l) (mg/dl)	3.46±1.19 133.42±46.09	2.75±1.30 105.80±50.37	76.19	<2.6 <100†
HDL-C (mmol/l) (mg/dl)	1.22±0.37 47.28±14.50	1.41±0.54 54.60±20.82	74.35	>1.04 >40†
Systolic blood pressure (mmHg)	136.57±19.08	138.18±21.82	52.54	≤130.0††
diastolic blood pressure (mmHg)	85.57±9.53	84.54±12.13	62.50	≤80.0††

\* American Diabetes Association <sup>(10)</sup>† NCEP/ATP III: National Cholesterol Education Program/Adult Treatment Panel III Guidelines. <sup>(11)</sup>†† NHANES: National Health And Nutrition Examination Survey. <sup>(12)</sup>**Table 2: Glycated hemoglobin (HbA1c) and blood pressure target achievement in the study population compared with other studies.**

Study, year and reference	Population	Setting of the study	Patients with HbA1c <7% (target)	Target blood pressure (mmHg)	Patients with BP < target (Systolic BP) (Diastolic BP)
<b>Current study, Baghdad, Iraq. (2010)</b>	Adults with diabetes	Outpatient (NDC) clinic, tertiary care center	32.78%	<130/80	52.54% 62.50%
<b>Riyadh, Saudi Arabia (2010) (14)</b>	Type 2 diabetics	Outpatient internal medicine clinics, tertiary care center	21.8%	<130/80	47.6% 74.6%
<b>Eastern and Western Saudi Arabia (2007) (15)</b>	Type 2 diabetics	Internal medicine and diabetic clinics	24.0%	<130/80	32.0%
<b>Beirut, Lebanon. (1999) (16)</b>	Type 1 and type 2 DM	Family medicine clinics	28.4%	<135/85	55.4% 65.7%
<b>NHANES* (1999-2000) (12)</b>	Adults with diabetes	National population based study	37.0%	<130/80	NA NA
<b>National Diabetes Audit UK (2003-2004) (13)</b>	All patients with diabetes	Health care sector audit	23.0%	<130/80	21.0%

\*NHANES: National Health and Nutrition Examination Survey. <sup>(10)</sup>