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The degree of diabetes control. Experience from Basrah for over nine years.

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Mansour etal. Basrah Diabetes control.

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 Abstracts

Background: Diabetes mellitus (DM) in Iraq reached an epidemic over the last decade. This study aimed to assess the achievement of the target glycated hemoglobin (HbA1c) for a cohort of type 2 DM from Basrah treated at primary, secondary and private care setting.

Methods: Retrospective database review for patients registered in the Faiha Specialized Diabetes, Endocrine and Metabolism Center (FDEMC) from August the 24th, 2008 onward until the end of July 2017. In September 2017 the data analyzed.

Results: The total enrolled 12869 patients. There were 7003(54.4%) women and 5866 men (45.6%). Around half of the patients were on insulin plus oral antidiabetic drugs (OAD). About 80% were overweight or obese. Only 13.8% achieved the target HbA1c of the total cohort. Men achieved control in 16.3% vs 11.8% in women. Factors statistically significant associated with poor glycemic control were age <55 year(OR, 1.34 ; 95% CI, 1.20 to1.50 ; P<0.0001),female gender(OR, 1.31 ; 95% CI, 1.18 to1.40 ; P <0.0001), duration of diabetes >3 years(OR, 2.9 ; 95% CI, 2.50 to2.34 ; P<0.0001),BMI at first visit <25 Kg/m^2 (OR, 0.78; 95% CI, 0.68 to 0.90 ; P=0.002) , uncontrolled blood pressure(OR, 0.8 ; 95% CI, 0.70 to0.90 ; P=0.002), presenting first HbA1c >10(OR, 3.2 ; 95% CI, 2.80 to 3.60   ; P <0.0001), and insulin treatment (OR, 2.6 ; 95% CI, 2.30 to2.90 ; P <0.0001) . Being male, duration of diabetes >6 years, duration of follow up > 8 years, number of visit >20 times, insulin treatment, HbA1c at first visit >15%, and baseline BMI <25 kg/m^2 are risk factors for weight gain.

Conclusion: Over nine years worse glycemic control achieved in Basrah. Insurance coverage to improve drug supply may be an option to improve glycemic control in patients with type 2 DM.

Keywords: Type 2 diabetes mellitus, glycemic control, targets, Basrah, Iraq

Core tip:

This study aimed to assess the achievement of the target glycated hemoglobin (HbA1c) for a cohort of type 2 DM from Basrah treated at primary, secondary and private care setting.

The total enrolled 12869 patients. Only 13.8% achieved the target HbA1c of the total cohort. Men achieved control in 16.3% vs 11.8% in women. Factors statistically significant associated with poor glycemic control were age <55 year,female gender, duration of diabetes >2 years,BMI at first visit <25 Kg/m^2 , uncontrolled blood pressure, presenting first HbA1c >10, and insulin treatment .

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INTRODUCTION

Diabetes mellitus (DM) in Iraq reached an epidemic over the last decade(1, 2). Because of the war and infrastructural damage over the decades, the health system could not cope with such increased in the number of patients seen each year(3). The whole population was not insured, and the care of diabetes is mixed between primary, secondary and tertiary care setting. The investigation for DM including certified methods for glycated hemoglobin (HbA1c) is not available on the wide base scale except in few tertiary centers and private sectors. Despite the proposal of free health system, most of the investigations for diabetes and drug treatment are not affordable. The primary care is just started to improve the situation, but because of extraordinary increased in the numbers of patients with diabetes in the country, the health system needs a lot of efforts and cost to change the situation.

The source of drugs supplies to treat chronic noncommunicable disease whether primary, secondary or tertiary in Iraq not solved yet. The private sector plays an important role in drugs supply with out of pocket payments consequences know to everybody.

Faiha Specialized Diabetes, Endocrine, and Metabolism Center (FDEMC) is a tertiary referring center in Basrah (Southern Iraq) received patients from all Basrah. Its offer clinical assessment of patients with diabetes including anthropometric and blood pressure assessment. All the investigations for diabetes recommended by American Diabetes Association (ADA) (4) are available at affordable cost for all people, and the cost is covered by the Ministry of Health partially. Each 3-12

month, the investigations for patients with type 2 diabetes mellitus (T2DM) are going to be done. The center put much weight on education, self-care and give some oral antidiabetic with insulin and refer the patients for the public clinic which supposed to supply the medicine for the patients each month.

The applications of ADA, ABC which includes HbA1c, blood pressure (BP) and LDL-Cholesterol (LDL) constituted an integral part of diabetes care and are important for cardiovascular risk reduction[5]. Successful glycemic control should include diet, exercise, glucose monitoring and pharmacologic therapy [6]. These four pillars should be taken together.

The aim of this study, to assess the achievement of the glycemic target (the HbA1c) for a cohort of T2DM from Basrah treated at primary, secondary and private care setting.

MATERIALS AND METHODS

Design and setting

Retrospective database review for patients registered in the FDEMC from August the 24th, 2008 onward until the end of July 2017. Data analysis were done in September 2017.

Inclusion criteria all adults 19 years of age with T2DM registered in the Center, who have full data. Exclusion criteria all type 1 diabetes mellitus(T1DM) and pregnant women and those with a single visit or no HbA1c in the second visit. The study was part of a project to assess the degree of three pillars of diabetes control, which are glycemia, blood pressure, and lipid control.

Participants

The full anthropometric assessment was be done for all. Beside full history and examination. The enrolled patient's data include the date of the first visit, date of last visit, age at first visit, address, school achievement, occupation, marital status, smoking state, family history of T2DM, history of hypertension, and other comorbidities for diabetes. The Center receives patients self-referred or referred by doctors from private clinics, primary and secondary Care. The primary objective of the center is investigations and education about self-care. The patients visit the center every 3-12 months.

Each patient examined for blood pressure using semiautomated blood pressure measurement (Omron blood pressure oscillometric technology) with two reading five minutes apart. Weight and height measured with no shoes and light clothes using SECA 220 stadiometer. Screening for neuropathy based on symptoms and signs were done for all. But routine eye and dental screening were not part of the Center care.

Biochemical investigations

For all patients, routine biochemistry panel was done in the early morning after 8-12 hour fast including serum glucose, creatinine, lipid panel and HbA1c. Ten ml of venous blood were taken from each patient for investigations and put in the tubes according to the type of investigation.

ABC targets

The target according to ADA 2017(4), which includes HbA1c <7%, systolic blood pressure goal of<140 mmHg and or diastolic blood pressure of <90 mmHg and LDL <100 mg/dL. The results of blood pressure and lipid control will appear in future.

Statistical analysis

Data from access sheet entered SPSS Statistics Software - 23 Chicago, IL. Dichotomous variables were expressed as percentage. χ^2 test used for analysis of qualitative data. The univariate analysis used to examine relations among continuous variables. Variables that statistically significant associated with poor glycemic control were entered multiple logistic regression analysis to identify the independent correlates of the poor glycemic control.

Results

We enrolled 12869 patients (Table-1). There were 7003(54.4%) women and 5866 men (45.6%). Around half of the patients were on insulin plus oral antidiabetic drugs (OAD) and a half on OAD alone. About 80% were overweight or obese.

The degree of control is present in Figure -1. Only 13.8% achieved the target HbA1c of the total cohort. Men achieved control in 16.3% vs. 11.8% in women.

Table -2 shows the risk factors associated with uncontrolled DM. Uncontrolled DM was more in age <55 years(OR, 1.27; 95% CI, 1.14 to 1.40; P<0.0001), females (OR, 1.46; 95% CI, 1.32 to 1.62; P<0.0001), duration of DM >3 years (OR, 3.52; 95% CI, 3.17 to 3.90; P<0.0001), duration of follow up >2 years(OR, 1.82; 95% CI, 1.64 to 2.01; P<0.0001), family history of diabetes (OR, **1.15**; 95% CI, 1.04 to 1.27; P=0.004), BMI<25 kg/m^2 (OR, **1.14** ; 95% CI, 0.99 to 1.30 ; P=0.031), No hypertension (OR, **1.17**; 95% CI, 1.06 to 1.29; P=0.001), number of visit >20 time (OR, 1.68; 95% CI, 1.38 to 2.03; P<0.0001), insulin treatment (OR, 3.89; 95% CI, 3.48 to 4.35; P<0.0001), HbA1c >10 at first visit (OR, 3.93; 95% CI, 3.50 to 4.40; P<0.0001), and those with no lipid control (OR, **1.45**; 95% CI, 1.31 to 1.62; P<0.0001).

Variables that are statistically associated with poor glycemic control were entered into logistic regression analysis (Table-3). Only the age <55 year(OR, 1.34 ; 95% CI, 1.20 to1.50 ; P<0.0001), female gender(OR, 1.31 ; 95% CI, 1.18 to1.40 ; P <0.0001), duration of diabetes >3 years(OR, 2.9 ; 95% CI, 2.50 to2.34 ; P<0.0001),BMI at first visit <25 Kg/m^2 (OR, 0.78; 95% CI, 0.68 to 0.90 ; P=0.002), uncontrolled blood pressure(OR, 0.8 ; 95% CI, 0.70 to 0.90 ; P=0.002), presenting first HbA1c >10 (OR, 3.2 ; 95% CI, 2.80 to3.60 ; P <0.0001), uncontrolled lipid (OR, 1.4 ; 95% CI, 1.20 to 1.50 ; P <0.0001) and insulin treatment(OR, 2.6 ; 95% CI,2.30 to2.90 ; P <0.0001) remain statistically significantly associated with poor glycemic control.

Table-4 shows risk factors associated with weight gain in patients with DM. Being male, duration of diabetes >6 years, duration of follow up > 8 years, number of visit >20 times, insulin treatment, HbA1c at first visit >15%, and baseline BMI <25 kg/m^2 are risk factors for weight gain**.**

Discussion

This was the largest cohort of type 2 diabetes mellitus from Iraq that has full data and knowledge to assess the degree of glycemic control among patients attending tertiary care setting. This database gives a clue for poor glycemic control in Basrah and Iraq. Being a large number of patients with diabetes involved, this will open the door to discuss the obstacles for glycemic control of the country. But this poor glycemic control of 13.8% seen in this study was also seen in some countries of the Gulf. (7) Moreover, a specialized diabetic clinic in the area achieved worse glycemic control than general clinics. (7)

The glycemic control in Saudi Arabia, UAE and Lebanon range from 30-40%.(8-10) While in Oman 50% achieved glycemic control. (11) Only one study from Sudan has glycemic control in 15% and Iran 13.2%. (12, 13) Overall world achievement of the glycemic target reach, 43% of large metanalysis involved 369,251 patients(14). In a large cohort attending government health services in Indonesia, Peru, Romania and South Africa, glycemic target achieved in 11.2%-28.2% according to the country.(15)

Younger age people achieved poor glycemia in this study. This is similar to that seen in Japan. (16)

Women in Saudi Arabia, Iran, and the USA achieved better glycemic control, while in this study and Jordanian women had poor glycemic control. (8, 12, 17, 18)

Unfortunately, long-term follow-up and number of the visit were not associated with the better control in this study. A new patient has better glycemic control, which also seen in another study from Malaysia. (19) Longer duration of diabetes is a fact for loss of control with time. (13, 20) The more number of visits associated with worse outcome seen in Isfahan, Iran(12)

Lower BMI and uncontrolled blood pressure were associated with uncontrolled diabetes in this study. In Iran, BMI was not a predictor of poor glycemic control. (21)

We have seen that insulin treatment was a risk factor for poor glycemic control. Treatment with oral antidiabetic is always associated with the better

glycemic control. (15, 22, 23) Higher presenting HbA1c and uncontrolled lipid was also a risk factor for poor glycemic control. This was also seen before. (12, 23)

A lot of factors in this study were associated with weight gain. Insulin use and higher baseline HbA1c and lower BMI which were associated with more weight gain in this study, that was also seen among a large cohort with type 2 diabetes mellites. (24) The weight gain was more among men in this study, while women with diabetes gain more weight in UK cohort study. (25)

Conclusions: This was the largest cohort of type 2 diabetes mellitus from Iraq that has full data and knowledge to assess the degree of glycemic control. In Basrah, we achieved the worse glycemic control despite nine years of efforts. Changing the glycemic target toward 7- 8% suggested by ACP 2018 will be the more pragmatic approach. (26) Solving the issue of unified drug supply and introducing insurance for all those with chronic illness will be the only option to improve the care since we have in Iraq a lot of medicine supply sources for non communicabkle disease .(27)

Availability of data and materials
Data are available on request to the authors

Authors' contributions

Authors equally contributed to this article.

Competing interest

None

Ethics approval and consent to participate

All patients gave written informed consent and agreed to analyses their data before being registered in the Center.

References

1.   Mansour AA, Al-Maliky AA, Kasem B, Jabar A, Mosbeh KA. Prevalence of diagnosed and undiagnosed diabetes mellitus in adults aged 19 years and older in Basrah, Iraq. Diabetes, metabolic syndrome and obesity : targets and therapy. 2014;7:139-44.

2.   Mansour AA, Al Douri F. Diabetes in Iraq: Facing the epidemic. A systematic review. Wulfenia Journal. 2015;22(3):258-73.

3.   Mansour AA, Wanoose HL. Insulin crisis in Iraq. The Lancet. 2007;369:1860.

4.   Standards of Medical Care in Diabetes-2017: Summary of Revisions. Diabetes Care. 2017;40(Suppl 1):S4-S5.

5.   Menon AS, Ahluwalia AI. The ABC of diabetes. How many patients are able to achieve the goal laid down by American Diabetes Association? Med J Armed Forces India. 2015;71(2):132-4.

6.   Yacoub TG. Application of clinical judgment and guidelines to achieving glycemic goals in type 2 diabetes: focus on pharmacologic therapy. Postgrad Med. 2014;126(3):95-106.

7.   Al-Rasheedi AA. Glycemic Control among Patients with Type 2 Diabetes Mellitus in Countries of Arabic Gulf. International Journal of Health Sciences. 2015;9(3):345-50.

8.   Alsulaiman TA, Al-Ajmi HA, Al-Qahtani SM, Fadlallah IM, Nawar NE, Shukerallah RE, et al. Control of type 2 diabetes in King Abdulaziz Housing City (Iskan) population, Saudi Arabia. J Family Community Med. 2016;23(1):1-5.

9.   Azar ST, Malha LP, Zantout MS, Naja M, Younes F, Sawaya MT. Management and control of patients with type 2 diabetes mellitus in Lebanon: results from the International Diabetes Management Practices Study (IDMPS). Le Journal medical libanais The Lebanese medical journal. 2013;61(3):127-31.

10.   Alhyas L, Cai Y, Majeed A. Type 2 diabetes care for patients in a tertiary care setting in UAE: a retrospective cohort study. JRSM Short Reports. 2012;3(10):67.

11.   D'souza MS. Determinants of Glycosylated Haemaglobin among Adults with Type 2 Diabetes Mellitus. Journal of Diabetes & Metabolism. 2013;04(05).

12.   Esteghamati A, Larijani B, Aghajani MH, Ghaemi F, Kermanchi J, Shahrami A, et al. Diabetes in Iran: Prospective Analysis from First Nationwide Diabetes Report of National Program for Prevention and Control of Diabetes (NPPCD-2016). Scientific Reports. 2017;7(1).

13.   Noor SK, Elmadhoun WM, Bushara SO, Almobarak AO, Salim RS, Forawi SA, et al. Glycaemic control in Sudanese individuals with type 2 diabetes: Population based study. Diabetes Metab Syndr. 2017;11 Suppl 1:S147-S51.

14.   Khunti K, Ceriello A, Cos X, De Block C. Achievement of guideline targets for blood pressure, lipid, and glycaemic control in type 2 diabetes: A meta-analysis. Diabetes research and clinical practice. 2018;137:137-48.

15.   Soetedjo NNM, McAllister SM, Ugarte-Gil C, Firanescu AG, Ronacher K, Alisjahbana B, et al. Disease characteristics and treatment of patients with diabetes mellitus attending government health services in Indonesia, Peru, Romania and South Africa. Trop Med Int Health. 2018.

16.   Hu H, Hori A, Nishiura C, Sasaki N, Okazaki H, Nakagawa T, et al. Hba1c, Blood Pressure, and Lipid Control in People with Diabetes: Japan Epidemiology Collaboration on Occupational Health Study. PLoS One. 2016;11(7):e0159071.

17.   Cheung BM, Ong KL, Cherny SS, Sham PC, Tso AW, Lam KS. Diabetes prevalence and therapeutic target achievement in the United States, 1999 to 2006. Am J Med. 2009;122(5):443-53.

18.   Adham M, Froelicher ES, Batieha A, Ajlouni K. Glycaemic control and its associated factors in type 2 diabetic patients in Amman, Jordan. East Mediterr Health J. 2010;16(7):732-9.

19.   Eid M, Mafauzy M, Faridah AR. Glycaemic Control of Type 2 Diabetic Patients on Follow Up at Hospital Universiti Sains Malaysia. The Malaysian Journal of Medical Sciences : MJMS. 2003;10(2):40-9.

20.   Hayashino Y, Izumi K, Okamura S, Nishimura R, Origasa H, Tajima N, et al. Duration of diabetes and types of diabetes therapy in Japanese patients with type 2 diabetes: The Japan Diabetes Complication and its Prevention prospective study 3 (JDCP study 3). Journal of Diabetes Investigation. 2017;8(2):243-9.

21.   Janghorbani M, Amini M. Patterns and Predictors of Long-Term Glycemic Control in Patients with Type 2 Diabetes. ISRN Endocrinology. 2012;2012:526824.

22.   Lozovey NR, Lamback EB, Mota RB, Caarls MB, Neto LV. Glycemic Control Rate in Type 2 Diabetes Mellitus Patients at a Public Referral Hospital in Rio de Janeiro, Brazil: Demographic and Clinical Factors. Journal of Endocrinology and Metabolism. 2017;7(2):61-7.

23.   Mullugeta Y, Chawla R, Kebede T, Worku Y. Dyslipidemia Associated with Poor Glycemic Control in Type 2 Diabetes Mellitus and the Protective Effect of Metformin Supplementation. Indian Journal of Clinical Biochemistry. 2012;27(4):363-9.

24.   Balkau B, Home PD, Vincent M, Marre M, Freemantle N. Factors associated with weight gain in people with type 2 diabetes starting on insulin. Diabetes Care. 2014;37(8):2108-13.

25.   Tuthill A, McKenna MJ, O'Shea D, McKenna TJ. Weight changes in type 2 diabetes and the impact of gender. Diabetes Obes Metab. 2008;10(9):726-32.

26.   Qaseem A, Wilt TJ, Kansagara D, Horwitch C, Barry MJ, Forciea MA. Hemoglobin A1c Targets for Glycemic Control With Pharmacologic Therapy for Nonpregnant Adults With Type 2 Diabetes Mellitus: A Guidance Statement Update From the American College of Physicians. Annals of Internal Medicine. 2018.

27.   Ibrahim IR, Wayyes AR. Pharmacy Practice in Iraq. Pharmacy Practice in Developing Countries2016. p. 199-210.

Table-1-General characteristics

|		N (%) or Mean ±SE
Total		12869(100)
Mean age		51.4±0.09
Gender	Men	5866(45.6)
	Women	7003(54.4)
Treatment	OAD	5889(45.8)
	Insulin+ OAD	6980(54.2)
Duration of DM in years		9.7±0.06
Duration of follow-up in years		3.22±0.02
Number of visits		9±1
BMI kg/m^2	Mean ±SE	29.9±0.05
	≥25	10227(79.5)
	<25	2642(20.5)
HbA1c at booking		10.1±0.02
Last HbA1c		9.6±0.02
Weight gain in Kg		1.6±0.06
*OAD= Oral antidiabetic drugs		

Figure -1- Control rate
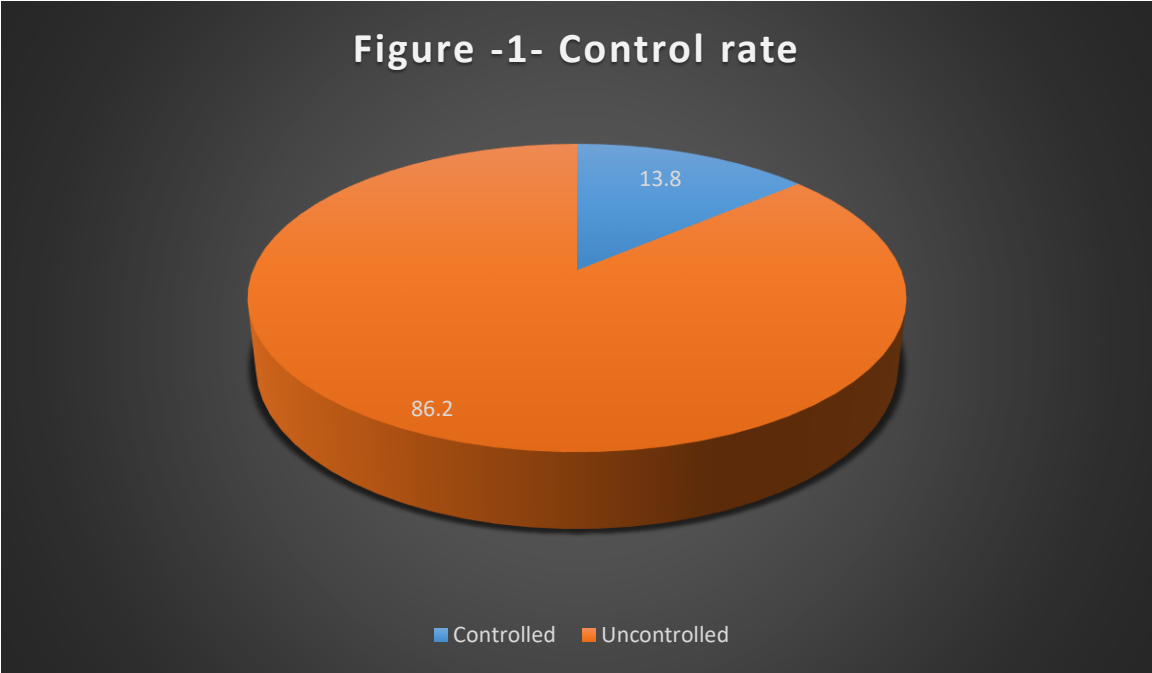
Figure -1- Control rate

Table-2-Risk factors associated with uncontrolled DM.

		Uncontrolled	Controlled	OR Risk estimate	95% CI		P value
		N (%)	N (%)		Lower	Upper	
Age (years)	**<55**	7221(87.2)	1062(12.8)	**1.27**	1.14	1.40	<0.0001
	≥55	3866(84.3)	720(15.7)				
Gender	**Females**	6179(88.2)	824(11.8)	**1.46**	1.32	1.62	<0.0001
	Males	4908(83.7)	958(16.3)				
Duration of DM (years)	**>3 years**	9956(89.0)	1231(11.0)	**3.52**	3.17	3.90	<0.0001
	≤3 years	1131(67.2)	551(32.8)				
Family history of diabetes	**Yes**	6979(86.8)	1062 (13.2)	**1.15**	1.04	1.27	0.004
	No	4065 (85.1)	711 (14.9)				
Duration of follow –up (years)	**>2 years**	7368(88.8)	929(11.2)	**1.82**	1.64	2.01	<0.0001
	≤2 years	3719(81.3)	853(18.7)				
Number of visits	**>20**	1253(90.9)	126(9.1)	**1.68**	1.38	2.03	<0.0001
	≤20	9834(85.6)	1656(14.4)				
Hypertension	No	6485 (86.9)	974 (13.1)	**1.17**	1.06	1.29	0.001
	Yes	4602 (85.1)	808 (14.9)				
BMI at first visit kg/m^2	<25	2042 (87.4)	295 (12.6)	**1.14**	0.99	1.30	0.031
	≥25	9045 (85.9)	1487 (14.1)				
HbA1c % at first visit	**>10**	6164(93.5)	431(6.5)	**3.93**	3.50	4.40	<0.0001
	≤10	4923(78.5)	1351(21.5)				
Lipid control	**No**	7943(87.5)	1131 (12.5)	**1.45**	1.31	1.62	<0.0001
	Yes	3144 (82.8)	651 (17.2)				
Mode of treatment	**Insulin**	6504(93.2)	476(6.8)	**3.89**	3.48	4.35	<0.0001
	OAD	4583(77.8)	1306(22.2)				

Table -3- Result of multivariate logistic regression analysis

Variables	Odds ratio (95% CI)	P value
Age <55 years	1.34 (1.20-1.50)	<0.0001
Female	1.31 (1.18-1.40)	<0.0001
Duration of DM > 3 years	2.9 (2.50-3.34)	<0.0001
Family history of DM	1.04 (0.90-1.17)	0.4
Duration of follow up > 2 years	1.1 (0.90-1.20)	0.1
Number of visits > 20	0.9 (0.70-1.10)	0.4
BMI at first visit <25 Kg/m^2	0.78 (0.68-0.90)	0.002
Uncontrolled blood pressure	0.8 (0.70-0.90)	0.002
First HbA1c >10	3.2 (2.80-3.60)	<0.0001
Uncontrolled lipid	1.4 (1.20-1.50)	<0.0001
Insulin treatment	2.6 (2.30-2.90)	<0.0001

Table -4-Risk factors associated with weight gain in diabetes

		Mean weight gain ±SE(Kg)	P value
Gender	**Males**	1.88±0.92	<0.0001
	Females	1.43±0.85	
Duration of DM	**>6 Years**	2.44±0.8	<0.0001
	≤6 Years	-0.02±0.01	
Duration of follow – up	**>8 Years**	4.67±0.45	<0.0001
	≤8 Years	1.52±0.06	
Number of visits	**>20**	5.37±0.25	<0.0001
	≤20	1.18±0.06	
BMI at first visit kg/m^2	**<25**	4.47±0.15	<0.0001
	≥25	0.90±0.70	
HbA1c at first visit	**>15**	4.90±0.52	<0.0001
	≤15	1.56±0.06	
Mode of treatment	**Insulin**	3.06±0.93	<0.0001
	OAD	-0.06±0.01	