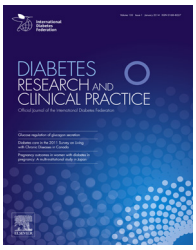
Contents available at ScienceDirect

Diabetes Research and Clinical Practice

journal homepage: www.elsevier.com/locate/diabres

International Diabetes Federation



Brief report

Glycaemic control is harder to achieve than blood pressure or lipid control in Irish adults with type 1 diabetes

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ARTICLE INFO

Article history:
Received 5 August 2014
Received in revised form
9 September 2014
Accepted 15 September 2014
Available online 5 October 2014

Keywords:
Blood pressure
HbA1c
LDL-cholesterol
Type 1 diabetes
Vascular risk

ABSTRACT

We sought to determine the attainment of targets for glycaemic control and vascular risk reduction in an Irish cohort of T1DM adults. Of 797 patients (53% male, mean age 40.3 ± 14.8 years, HbA1c 8.5 ± 1.6% (69.6 ± 17.8 mmol mol^{-1})), 15%, 68% and 62% achieved targets for HbA1c, blood pressure and LDL cholesterol, respectively.

1. Introduction

Type 1 diabetes mellitus (T1DM) is associated with increased all-cause and cardiovascular morbidity and mortality [1,2]. Achieving optimal glycaemic control leads to improved outcomes [3] and reduced cardiovascular morbidity and mortality [4]. Clinical practice guidelines, such as those from the American Diabetes Association (ADA) [5], outline specific targets for glycaemic control and cardiovascular risk factors in T1DM patients. However, implementing these guidelines and achieving these targets in routine clinical practice is challenging [6]. Data on T1DM outcomes in the Republic of Ireland are limited, despite a relatively high prevalence [7]. We sought to describe the characteristics of T1DM adults attending an Irish University teaching hospital and to determine the prevalence of optimal glycaemic and vascular risk factor control according to internationally recognised standards of clinical practice.

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http://dx.doi.org/10.1016/j.diabres.2014.09.036

2. Methods

We conducted a retrospective cross-sectional cohort study of all patients over 18 years of age with T1DM, attending our Diabetes Centre between July 2011 and June 2013. Diagnostic criteria for T1DM include the typical clinical osmotic symptoms and signs of diabetes, the presence of ketoacidosis, weight loss, the requirement for continuous insulin therapy after diagnosis and the presence of autoantibodies associated with autoimmune beta-cell destruction. The study was approved by the hospital's Clinical Research Ethics Committee.

Data from the patient's most recent visit were extracted from our diabetes database, Diamond®. Specifically, anthropometric measures including age, gender, ethnicity, weight, height, body mass index (BMI), systolic and diastolic blood pressure and metabolic variables including HbA1C, total-, LDL- and HDL-cholesterol, triglycerides and albumin: creatinine ratio (ACR) were recorded. All anthropometric measurements were taken according to a standard departmental protocol. Weight and height were measured using a Seca® scale and wall-mounted stadiometer, respectively. Blood pressure was measured with a Welch Allyn® Dinamap oscillometric device. All blood samples were processed locally in the GUH Department of Clinical Biochemistry (certified to ISO 15189 2007 accreditation standard). HbA1c was measured with HPLC (Menarini® HA8160 auto-analyzer). Total cholesterol was measured using the CHOP-PAP method. HDL-cholesterol and triglycerides were measured using the enzymatic and the GPO-PAP methods, respectively (COBAS® 8000 modular analyzer). LDL-cholesterol was derived with the Friedewald equation [8]. ACR was measured with the Jaffe method.

We used the ADA Clinical Practice Recommendations [5] to define thresholds for optimal glycaemic control as outlined in Table 1. Continuous and categorical data were analysed using *t*-tests and Fisher's exact tests, respectively. Minitab version 16 (Pennsylvania, USA) was used for analyses.

3. Results

797 adults with T1DM (mean age 40.3 ± 14.8 years, 53% male) attended during the study period. 782 (98%) were White Europeans, with 15 (2%) of Asian or African ethnicity. 728 (91.4%) were on a basal bolus insulin regimen, 32 (4%) were using insulin pumps, 33 (4.1%) twice-daily pre-mixed insulin and 4 (0.5%) a combination of pre-mixed and short-acting insulin. 273 (34.2%) were on lipid lowering medication, 214 (26.9%) on aspirin and 318 (39.9%) on antihypertensive therapy: 200 (25%) on monotherapy (94% of whom were on angiotensin converting enzyme inhibitors (ACEI) or angiotensin receptor blockers (ARB)) and 62 on dual antihypertensive therapy, usually a calcium channel blocker (CCB) ACEI/ARB combination. 56 patients (7%) were on three or more antihypertensive medications.

Patient characteristics and the proportions achieving ADA treatment targets are shown in Table 1. The prevalence of overweight and obesity was 33.5% and 19.4%, respectively, while 68.2% had systolic and diastolic blood pressure at target. 171 of 743 patients (23%) screened for microalbuminuria had an ACR above target and of these, 63.2% were on renin–angiotensin–aldosterone system (RAS) blockade. Compared to the proportions achieving target HbA1c (117/791, 14.8%), good blood pressure and lipid control were significantly higher (542/795, 68.2% and 453/734, 61.6%, both $p = 0.001$, respectively). We found a weak but statistically significant inverse association between age and HbA1c (%), unadjusted $\beta = -0.0208$, $p < 0.001$, such that for each ten year increment in age, HbA1c was 0.2% higher.

4. Discussion

In a cohort of predominantly white Irish adults with T1DM, the prevalence of optimal blood pressure and lipid control was higher than that for glycaemic control. Similar findings have been reported in Brazilian [9] and Scottish [1] T1DM adults, with 13.2% and 13% achieving the same HbA1c target.

Table 1 – Anthropometric and metabolic characteristics of adults with type 1 diabetes and the prevalence of attainment of satisfactory cardiovascular risk factor modification.

Variable	*n*	Mean	±SD	ADA target value	Prevalence of achieving ADA target value, *n* (%)
Body mass index (kg m^{-2})	781	26.4	±4.8	<25	359 (46)
Systolic BP (mmHg)	795	125.1	±15.8	<140	670 (84.3)
Diastolic BP (mmHg)	795	73	±9	<80	597 (75.1)
HbA1c (%/mmol mol^{-1})	791	8.5/69.6	±3/17.8	<7/53	117 (14.8)
Total cholesterol (mmol l^{-1})	743	4.6	±1.1	≤5	513 (69)
LDL cholesterol (mmol l^{-1})	734	2.4	±0.8	<2.6	453 (61.7)
HDL cholesterol (mmol l^{-1})	737	1.7	±0.5	>1 (males), >1.3 (females)	625 (84.8)
Triglycerides (mmol l^{-1})	736	1.2	±1.2	<1.7	601 (81.7)
MACR (mg mmol l^{-1})[a]	743	171[a]	23%[a]	≤2.5 (males), ≤3.5 (females)	572 (77)

ADA, American Diabetes Association; BP, blood pressure; HDL, high density lipoprotein; LDL, low density lipoprotein; MACR, microalbumin:creatinine ratio; SD, standard deviation.

[a] For MACR, the number of affected individuals and percentage prevalence of microalbuminuria are presented and guideline thresholds from the National Institute for Health and Care Excellence (UK) were used [16].