

Achievement of metabolic control in diabetic patients treated at a healthcare facility in Boyacá

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Abstract

Introduction: the growing prevalence of diabetes calls for specific tests to detect diabetes and pre-diabetes in at-risk groups. Setting clear goals in this population is an effective strategy for achieving glycemic and metabolic control, reducing the risk of complications, mortality and related sequelae.

Objective: to evaluate the rate of paraclinical goal achievement in diabetic patients seen at a healthcare facility in Boyacá.

Methods: this was a cross-sectional descriptive observational study of patients with type 2 diabetes mellitus in the outpatient department of a healthcare facility in the department of Boyacá. It evaluated the achievement of goals related to anthropometric and paraclinical measurement follow-up.

Results: altogether, 6,128 patients were enrolled, of whom 55.7% were women and 2% were under age 40. A total of 90.96% had adequate systolic and diastolic blood pressure control. However, only 6.7% also met all the treatment goals (glycemia, lipid profile, anthropometric measurements and kidney function).

Conclusions: patients with diabetes have micro and macrovascular abnormalities that are associated with the onset of complications. Despite this, a large proportion of these patients have poor adherence to treatment and poor accomplishment of therapeutic goals, which contributes to the persistence of adverse outcomes and disease-related problems. (*Acta Med Colomb* 2025; 50. DOI: <https://doi.org/10.36104/amc.2025.4359>).

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Introduction

Hyperglycemia is the main clinical and diagnostic characteristic of diabetes. This is a relevant finding, as it constitutes an established risk factor for microvascular complications like diabetic retinopathy, nephropathy and neuropathy. This is because nerve, retinal and renal cells do not require insulin for intracellular glucose uptake; therefore, exposure to high environmental glyceic levels, even with insulin deficiency (absolute or relative), causes intracellular metabolic dysfunction that increases the risk of cellular damage (1, 2).

The growing prevalence of diabetes requires that specific tests be done to detect diabetes and prediabetes in at-risk groups. This strategy allows measures to be taken early to prevent the onset of the disease and delay its progression (3, 4). One study found that the prevalence of this endocrine disease in people under the age of 40 has increased over the last decade, and that this group has the highest frequency of complications, attributed to poor metabolic control and a longer duration of the disease (5).

Cardiovascular diseases are the most common cause of death in patients with diabetes mellitus (6). This is related

to metabolic changes and increased dyslipidemia, making it essential to monitor these laboratory parameters. A relationship has been found between low HDL levels and the risk of cardiovascular disease (7). Furthermore, strict control of low-density lipoproteins is recommended in these patients due to the high risk of adverse cardiovascular events, with lipid-lowering treatment being key (8).

In this population, setting clear goals is an effective strategy for achieving adequate glyceic and metabolic control, thus reducing the risk of complications, the mortality rate and sequelae (9, 10). However, good patient adherence to treatment and lifestyle changes is essential for optimizing disease control (11, 12).

The objective of this study was to evaluate the target achievement rates for laboratory tests in patients with diabetes mellitus seen at a healthcare facility in the department of Boyacá.

Method

Type of study and population

This was an observational, retrospective, descriptive, cross-sectional study that included patients over the age

of 18 with type 2 diabetes mellitus seen in the outpatient department of a healthcare facility in the department of Boyacá. The objective was to evaluate target achievement in patients' anthropometric and laboratory measurements.

The inclusion criteria were: adult patients seen by the internal medicine and diabetes service from February 1, 2023, to February 31, 2024, who had a prior type 2 diabetes mellitus diagnosis, a complete medical chart and pharmacological treatment. Patients with inconsistent information, pregnant women and people with a diagnosed mental illness were excluded, as this type of illness was considered to predispose them to poor adherence to treatment and healthy lifestyles.

Variables

The data was obtained directly from the healthcare facility's information system, which covers three cities in the department of Boyacá (Tunja, Duitama and Sogamoso). The information gathered included the variables relevant to the study, with the institution's prior approval for using the data, ensuring confidentiality.

The questionnaire included sociodemographic variables, systolic and diastolic blood pressure, anthropometric measurements (weight, height and abdominal circumference), glycosylated hemoglobin and the lipid profile. The targets were set based on the cut-off points proposed by the American Diabetes Association (ADA) (1, 13).

Statistical analysis

The database was recorded in Excel version 2013, and analysis was done using the SPSS version 22 statistical package (© Copyright IBM Corporation, License IBM Z125-3301-14). Univariate analysis was done using descriptive statistics: absolute and relative frequencies were determined for categorical variables, and measures of central tendency (mean and median) and dispersion (standard deviation and interquartile range) were calculated for quantitative variables.

Ethical considerations

This was considered a no-risk study, according to the principles established in the Declaration of Helsinki and Resolution 8430 of October 4, 1993. In addition, the data was handled confidentially to protect patient information, in accordance with the current legal norms.

Results

Participant selection

A total of 19,329 patients with chronic illnesses are cared for by the healthcare facility (HF) of Boyacá. Of these, 6,128 are patients with diabetes and were included in this study.

Sociodemographic characteristics

The patients are cared for in three different cities, with 55.7% being females. Two percent of the patients were under the age of 40 (Table 1).

Comorbidities

The patients had been followed by the HF for an average of 2,944 days (8 years), with an SD of 1,981 days (5.4 years). A total of 90.96% of the patients had controlled systolic and diastolic blood pressure, and less than 1% had chronic kidney disease (Table 2).

Treatment target achievement

A total of 6.7% of the patients met all the treatment follow-up goals (glycemia, lipid profile, anthropometric measurements and kidney function) based on the ADA guidelines (Table 3).

Discussion

Type 2 diabetes is a chronic disease that increases cardiovascular risk. Comprehensive management of this risk in diabetic patients delays the onset of complications and multiplies patient benefits. However, the degree to which this disease and its accompanying risk factors are controlled is very deficient (14, 15).

The study by Gómez et al. (16) reported that, among patients with diabetes mellitus, 67.2% did not follow their diet plan, 72.8% were sedentary, 47% did not adhere to medication, 72.6% did not achieve their target blood pressure, 67.2% did not achieve their target LDL cholesterol, 60.4% did not achieve their target HDL, 78.4% did not achieve their target fasting blood sugar, and 63.4% did not maintain a glycosylated hemoglobin of <7 g/dL.

The study by Díaz Grávalos et al. (17) found that 44.3% of the people in the sample had had an HbA1c drawn in the prior six months and had a level of less than 7%. A total of 21.2% had a blood pressure under 130/80 mmHg, and 19.8% had an LDL cholesterol level under 100 mg/dL. Altogether, 20.4% of those with high blood pressure were not being treated with antihypertensive medication. Considering these three factors, only 2.5% achieved target control.

Cicchiti et al. (18) reported that 94.8% had a systolic blood pressure under 140 mmHg; 82.2% did not use tobacco; 56.5% had an LDL-C ≤ 100 mg/dL; 39% exercised ≥ 3 times per week; and 20.3% had a glycosylated hemoglobin (HbA1c) under 7%. Only 26 patients (6.2%) achieved all five analyzed targets. Achieving these targets was associated with a secondary school or higher level of education ($p=0.002$) and employment-related or private-pay health insurance ($p=0.002$). There was a significant association between the eGDR of those who achieved the five targets ($p=0.02$) and of four of the individual targets (SAP, LDL-C, HbA1c and exercise).

These findings are relevant, as they confirm that patients with diabetes mellitus have a low achievement rate for follow-up goals and targets. It should be noted that this disease causes macrovascular and/or microvascular changes, which increases the risk of cardiovascular disease and events like myocardial infarction, heart failure, stroke, kidney failure and lower survival (19–21).

Table 1. Sociodemographic characteristics.

Variable		Sex				Total (n: 6128)	%
		Female (n: 3414)	%	Male (n: 2714)	%		
City	Duitama	1,053	17.18	833	13.59	1,886	30.78
	Sogamoso	1,559	25.44	1,214	19.81	2,773	45.25
	Tunja	802	13.09	667	10.88	1,469	23.97
Type of health insurance	Contributive	3,271	53.38	2,555	41.69	5,826	95.07
	Subsidized	143	2.33	159	2.59	302	4.93
Age group (in years)	18 - 19	3	0.05	7	0.11	5	0.08
	20 - 24	2	0.03	8	0.13	10	0.16
	25 - 29	11	0.18	8	0.13	19	0.31
	30 - 34	20	0.33	16	0.26	36	0.59
	35 - 39	23	0.38	38	0.62	61	1.00
	40 - 44	46	0.75	87	1.42	133	2.17
	45 - 49	96	1.57	105	1.71	199	3.25
	50 - 54	207	3.38	179	2.92	386	6.30
	55 - 59	290	4.73	263	4.29	553	9.02
	60 - 64	463	7.56	404	6.59	867	14.15
	64 - 69	562	9.17	432	7.05	994	16.22
	70 - 74	586	9.56	474	7.73	1,060	17.30
	75 - 79	434	7.08	320	5.22	754	12.30
	80 - 84	338	5.52	204	3.33	542	8.84
	85 - 89	242	3.95	122	1.99	364	5.94
90 or more	91	1.48	47	0.77	138	2.25	
Marital status	Married	1,513	24.69	1,478	24.12	2,991	48.81
	Separated	191	3.12	107	1.75	298	4.86
	Single	742	12.11	596	9.73	1,338	21.83
	Cohabiting	320	5.22	417	6.80	737	12.03
	Widowed	648	10.57	116	1.89	764	12.47

Table 2. Comorbidities.

Variable		Sex				Total (n: 6128)	%
		Female (n: 3414)	%	Male (n: 2714)	%		
Controlled systolic blood pressure	No	265	4.32	289	4.72	554	9.04
	Yes	3,149	51.39	2,425	39.57	5,574	90.96
Controlled diastolic blood pressure	No	265	4.32	289	4.72	554	9.04
	Yes	3,149	51.39	2,425	39.57	5,574	90.96
Chronic kidney disease	Yes	11	0.18	6	0.10	17	0.28

Source: Authors' own.

Table 3. Treatment goal achievement.

Achievement		Sex				Total (n: 6128)	%
		Female (n: 3414)	%	Male (n: 2714)	%		
Glycemia	No	1,710	27.90	1,536	25.07	3,246	52.97
	Yes	1,704	27.81	1,178	19.22	2,882	47.03
LDL	No	2,394	39.07	1,868	30.48	4,262	69.55
	Yes	1,020	16.64	846	13.81	1,866	30.45
HDL	No	2,631	42.93	1,808	29.50	4,439	72.44
	Yes	783	12.78	906	14.78	1,689	27.56
Triglycerides	No	2,431	39.67	1,939	31.64	4,370	71.31
	Yes	983	16.04	775	12.65	1,758	28.69
Microalbuminuria	No	1,390	22.68	1,442	23.53	2,832	46.21
	Yes	2,024	33.03	1,272	20.76	3,296	53.79
Body mass index	No	1,825	29.78	1,504	24.54	3,329	54.32
	Yes	1,589	25.93	1,210	19.75	2,799	45.68
Waist circumference	No	2,438	39.78	1,756	28.66	4,194	68.44
	Yes	976	15.93	958	15.63	1,934	31.56
Glycosylated hemoglobin	No	1,484	24.22	1,332	21.74	2,816	45.95
	Yes	1,930	31.49	1,382	22.55	3,312	54.05

HDL: high-density lipoprotein, LDL: low-density lipoprotein.

Some studies have found that a large proportion of patients do not adhere to treatment (medication and lifestyle changes) and are highly sedentary, which has repercussions on metabolic control of the disease (22, 23). These abnormalities affect the prefrontal cortex, causing changes in executive functions and fostering the onset of depressive symptoms and cognitive disorders (24).

High body mass index with poor control is a worldwide phenomenon. This seems to be due to the fact that most of these patients do not adhere to diet or exercise, which is associated with poor glycemic control and favors the onset of various complications (25, 26). Therefore, it is important to implement treatment approaches aimed at controlling blood sugar levels and lowering carbohydrate consumption, since greater blood sugar reduction is associated with better short and long-term outcomes (27).

A multidisciplinary approach produces satisfactory results in goal and target achievement. However, these depend on cooperation between the treatment team, patients and their families, in order to foster and support self-management (28). Treatment by a diabetes specialist has been reported to favor positive outcomes in this group of people, improving health outcomes and the quality of care (29). Furthermore, specialized care allows the patients to have the tools they need for outpatient follow-up with a glucometer and provides resources for proper monitoring (30, 31). One study showed that yoga and mindfulness have great potential for managing not only stress but also clinical-metabolic parameters and therefore may be considered valuable treatment tools (32).

Conclusions

Diabetes is a very common lifestyle-related metabolic disease. Close to 3% of patients were found to be under 40 years old. There was a low target achievement rate compared to other studies, in which most of these patients had poor adherence to treatment, low target achievement and disease-related problems secondary to this lack of commitment.

Patients with diabetes mellitus develop many micro and macrovascular changes that are associated with the onset of complications. Therefore, individual treatment goals must be established, in line with clinical guidelines. It is also important to provide multidisciplinary treatment, led by diabetes specialists, together with nurses and other healthcare professionals to contribute to patients' education and self-care.

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