Original Article

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Assessment of glycemic control in patients with type 2 Diabetes Mellitus

Avaliação do controle glicêmico de pacientes com Diabetes Mellitus tipo 2

Maria Eduarda da Silva Santos[1]*
Orcid: https://orcid.org/0000-0002-3022-4297

Livia Albuquerque Viol[2]*
Orcid: https://orcid.org/0000-0002-1647-184

Beatriz Rodrigues[3]*
Orcid: https://orcid.org/0000-0003-2426-2606

Paulo Roque Obreli Neto[4]*
Orcid: https://orcid.org/0000-0003-3749-9426

Luanna Gabriella Resende da Silva[5]
Oricid: https://orcid.org/0000-0003-1879-5166

Andre Oliveira Baldoni[6]**
http://orcid.org/0000-0001-6379-0415

Juliano Rodrigues Coimbra[7]*
Orcid: https://orcid.org/0000-0002-3227-452X

Abstract

Introduction: Strict control of blood glucose concentration prevents the onset and progression of microvascular complications related to type 2 diabetes mellitus (DM2). Objectives: The aim of this study was to evaluate the frequency of patients with DM2 treated in primary health care (PHC) of the Public Health System (*Sistema Único de Saúde* - SUS) who have adequate glycemic control. Materials and methods: A cross-sectional study was carried out, lasting five months, in the PHC of the SUS in the municipalities of Bernardino de Campos and Salto Grande, SP. Inclusion criteria were: medical diagnosis of DM2, age ≥ 18 years, having performed fasting blood glucose and glycated hemoglobin (HbA1c) tests less than 12 months before data collection, and being treated at the study health units. Results: 1313 patients were aged ≥ 18 years and had a medical diagnosis of DM2; however, 547 of these patients had undergone fasting blood glucose and HbA1c tests more than 12 months before data collection, and consequently did not meet all inclusion criteria. A total of 603 patients met all inclusion criteria and agreed to participate in the study. It was found that 190 patients (31,5 %) had fasting blood glucose and HbA1c within the target recommended by the guidelines of the Brazilian Society of Diabetes (*Sociedade Brasileira de Diabetes* - SBD). Conclusions: The results showed that a large number of patients with DM2 do not achieve adequate glycemic control, and do not perform fasting blood glucose and HbA1c tests at the frequency recommended by the SBD, requiring the adoption of new strategies to change this scenario.

Keywords: diabetes mellitus, type 2, glycemic control, primary attention

Resumo

Introdução: O controle rígido da concentração sanguínea de glicose previne o surgimento e a progressão de complicações microvasculares relacionadas ao diabetes mellitus tipo 2 (DM2). Objetivos: O objetivo deste estudo foi avaliar a frequência de pacientes com DM2 atendidos na atenção primária à saúde (APS) do Sistema Único de Saúde (SUS) que apresentam controle glicêmico adequado. Materiais e métodos: Foi realizado um estudo transversal, com duração de cinco meses, na APS do SUS dos municípios de Bernardino de Campos e Salto Grande, SP. Os critérios de inclusão foram: diagnóstico médico de DM2, idade ≥ 18 anos, ter realizado

*Centro Universitário das Faculdades Integradas de Ourinhos (UNIFIO) - Ourinhos - SP, Brasil.
** Universidade Federal de São João del-Rei - Minas Gerais – Brasil
[1] E-mail: 257711@unifio.edu.br
[2] E-mail: liviaaviol@outlook.com
[3] E-mail: beatrizrodrigues78@hotmail
[4] E-mail: paulo.roque@unifio.edu.br
[5] E-mail: luanna.grsilva@outlook.com
[6] E-mail: andrebaldoni@ufsj.edu.br
[7] E-mail: juliano.coimbra@unifio.edu.br

exames de glicemia de jejum e hemoglobina glicada (HbA1c) há menos de 12 meses da coleta de dados, ser atendido nas unidades de saúde do estudo. Resultados:1313 pacientes possuíam idade ≥ 18 anos, e diagnóstico médico de DM2; entretanto, 547 destes pacientes tinha realizado exame de glicemia de jejum e HbA1c há mais de 12 meses da coleta de dados, e consequentemente, não atenderam a todos os critérios de inclusão. Seiscentos e três pacientes atenderam a todos os critérios de inclusão e aceitaram participar do estudo. Foi verificado que 190 pacientes (31,5%) apresentaram glicemia de jejum e HbA1c dentro da meta recomendada pelas diretrizes da Sociedade Brasileira de Diabetes (SBD). Conclusões: Os resultados mostraram que número elevado de pacientes com DM2 não alcança controle glicêmico adequado, e não realiza exames de glicemia de jejum e HbA1c na frequência recomendada pela SBD, sendo necessário a adoção de novas estratégias para mudar este cenário.
Palavras-chave: diabetes mellitus tipo 2, controle glicêmico, atenção primária

Introduction

Chronic complications of type 2 diabetes mellitus (DM2) are divided into microvascular complications and macrovascular complications. The microvascular complications of DM2 are diabetic retinopathy, diabetic nephropathy, and diabetic neuropathy.1,2,3 In Brazil, 5.5 % of patients with DM2 have diabetic retinopathy, 6.9 % have diabetic nephropathy, and 11.4 % have diabetic neuropathy.4

Long-term controlled clinical trials have conclusively shown that the main way to prevent the onset and progression of microvascular complications of DM2 is intense glycemic control. Additionally, intense glycemic control can reverse the severity of the microvascular complication(s) that the patient presents.1,5,6,3

It is extremely important for health services to know the frequency of patients who do not achieve adequate glycemic control, because this makes it possible to assess the effectiveness of the care provided to these patients, and whether there is a need to adopt new strategies and health policies. However, most of the studies carried out in Brazil that evaluated the glycemic control of patients with DM2 were carried out in university outpatient clinics or private clinics. And the studies carried out in primary health care (PHC) units of the Public Health System (Sistema Único de Saúde - SUS), which is where the majority of the Brazilian population with DM2 is monitored, were conducted in large municipalities (population > 200,000 inhabitants), with 67.7 % of Brazilian municipalities having a population < 20,000 inhabitants.7 The size of municipalities directly influences many variables that can interfere with glycemic control, such as the structure of health services, number of health professionals per inhabitant, access to spaces for the practice of physical activity, among others.

In this sense, this study aimed to evaluate the frequency of DM2 patients treated by the SUS PHC, in municipalities with a population < 20,000 inhabitants, who achieve adequate glycemic control.

Materials and Methods

A cross-sectional study was carried out from June to October 2022 in PHC units of the SUS in the municipalities of Bernardino de Campos and Salto Grande, in the state of São Paulo. Bernardino de Campos has 11,158 inhabitants and three PHC health units, while Salto Grande has 9,364 inhabitants and three PHC health units. This project was approved by the ethics committee for research involving human beings of the Faculdade de Medicina de Marília under CAAE nº 57855722.1.0000.5413.

The inclusion criteria were: patients with a medical diagnosis of DM2, age > 18 years, who underwent a fasting blood glucose and glycated hemoglobin (HbA1c)

test less than 12 months before the date of data collection, and who were seen and registered in the units of PHC of these municipalities.

The identification of patients who met the inclusion criteria was performed using the patient's electronic medical record. The research team visited the homes of all eligible patients and invited them to participate in the study. Demographic (age, sex, education), clinical (diseases they present), and therapeutic information (medications they use) were collected.

The definition of the adequate goal of fasting glycemia and HbA1c was analyzed individually for each patient, following the criteria recommended by the guideline of the Brazilian Society of Diabetes (SBD).[3]

Descriptive statistics were used to assess the prevalence of patients with DM2 who achieved the appropriate target for fasting glucose and HbA1c.

Results

A total of 1,313 patients were aged > 18 years and had a medical diagnosis of DM2; however, more than 40 % of the patients (547 patients; 41.6 %) had performed a fasting blood glucose and HbA1c test more than 12 months previously, and consequently, did not meet all the inclusion criteria. Table 1 describes the date of the last fasting blood glucose and HbA1c test for each of these excluded patients.

Table 1. Date of the last fasting blood glucose and glycated hemoglobin test of the excluded patients. N = 547.

Time period	Result
13 – 24 months before the start of the study, n (%)	371 (67.8)
25 – 36 months before the start of the study, n (%)	127 (23.2)
> 36 months before the start of the study, n (%)	49 (9.0)

In total, 766 patients met all study inclusion criteria, and 603 of these patients agreed to participate in the study. Table 2 describes the demographic, clinical, and therapeutic characteristics of the patients.

Table 2. Demographic, clinical, and therapeutic characteristics of the studied population. N = 603.

Variable	Result
Age, mean (SD) years 63.1 (2.5)	63.1 (2.5)
Female, n (%) 380 (63.0)	380 (63.0)
Education, n (%)	
• Incomplete primary education 211 (35.0)	211 (35.0)
• Elementary school completed 392 (65.0)	392 (65.0)
Diseases shown, n (%)	
• Hypertension 407 (67.5)	407 (67.5)
• Isolated hypercholesterolemia 338 (56.0)	338 (56.0)
• Obesity 319 (52.9)	319 (52.9)
Diseases shown, average (SD) 3.6 (0.8)	3.6 (0.8)
Medication taken, n (%)	
• Metformin 594 (98.5)	594 (98.5)
• Glibenclamide 456 (75.6)	456 (75.6)
• Losartan 444 (73.6)	444 (73.6)
• Hydrochlorothiazide 371 (61.5)	371 (61.5)
• Amlodipine 343 (56.9)	343 (56.9)
• Simvastatin 330 (54.7)	330 (54.7)
Medication taken, mean (SD) 4.2 (0.5)	4.2 (0.5)

Table 3 describes the prevalence of patients with DM2 who achieved the target fasting glucose and/or HbA1c. More than 60 % of the patients did not achieve the target for any of the analyzed variables, and only 31.5 % of the patients achieved the target for fasting glycemia and glycated hemoglobin.

Table 3. Prevalence of patients with type 2 diabetes mellitus who achieved the blood pressure and glycated hemoglobin target. N = 603.

Variable	Result
Patients who achieved target fasting blood glucose and HbA1c, n (%)	190 (31.5)
Patients who only achieved the fasting blood glucose target, n (%)	15 (2.5)
Patients who achieved only the HbA1c goal, n (%)	13 (2.2)
Patients who did not achieve target fasting blood glucose and HbA1c, n (%)	385 (63.8)

Discussion

This is one of the first studies that evaluated the frequency of patients with DM2 treated by the SUS PHC, in municipalities with a population < 20,000 inhabitants, who achieved adequate glycemic control. It was found that only 31.5 % of patients achieved adequate control of fasting glucose and HbA1c; and more than 40 % of patients with DM2 did not undergo a fasting blood glucose and HbA1c test in the last 12 months. The results found showed that the strategies adopted in the follow-up of patients with DM2 are not effective for adequate glycemic control, and that fasting blood glucose and HbA1c tests are not being performed at the frequency recommended by the guidelines of the Brazilian Society of Diabetes.

A multicenter study carried out in cities in all regions of Brazil found that only 26 % of patients with DM2 treated (n = 5750) by PHC of the SUS had HbA1c < 7.0 %. This study was carried out in populous cities (Porto Alegre, Curitiba, São Paulo, Cotia, Campinas, Belo Horizonte, Rio de Janeiro, Brasília, Taquatinga, Fortaleza, Recife, Salvador, Belém and Manaus).8 Many of these cities have more than one million inhabitants, and do not represent the population size of most Brazilian municipalities.

In a study carried out in the city of Caxias do Sul, it was found that most patients with DM2 did not achieve adequate glycemic control regardless of where they were monitored (21.2 % of patients treated at a university outpatient clinic associated with the SUS had HbA1c < 7.0 % , and 25.0 % of patients treated in the private system had HbA1c < 7.0%).9

A cross-sectional study conducted in nine Latin American countries (Argentina, Brazil, Chile, Costa Rica, Ecuador, Guatemala, Mexico, Peru, and Venezuela) found that only 43.2 % of patients had HbA1c < 7.0 %. The number of Brazilians participating in this study was 885 patients.10

Studies carried out in developed countries such as the United States of America found a higher prevalence of patients with DM2 who achieved adequate glycemic control (52.5 - 54.0 %) than in Brazil.11,12 However, even in developed countries the number of DM2 patients who do not achieve adequate glycemic control is high, requiring the development of strategies to change this scenario.

Some limitations of this study deserve to be highlighted. The study was carried out in only two Brazilian municipalities with a population < 20,000 inhabitants, and therefore caution is needed

when extrapolating these results to the other 3768 Brazilian municipalities with a population < 20,000 inhabitants. Additionally, the study used information recorded in the patient's electronic medical record and responses given by patients; test results and drug prescriptions that were not recorded in the patient's electronic medical record or that the patient forgot may have been lost.

Conclusion

It was found that approximately seven out of ten patients with DM2 did not achieve adequate glycemic control, and that more than 40 % of the sample did not undergo fasting blood glucose and HbA1c tests in the previous 12 months. It is necessary to adopt new follow-up strategies for patients with DM2 in the PHC of the SUS.

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