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Risk factors and complications associated with patients with Diabetes Mellitus attended in an outpatient clinic in Minas Gerais

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ABSTRACT

Introduction: Diabetes mellitus (DM) is a significant cause of mortality and morbidity, and it is estimated that its prevalence will continue to rise significantly in the coming years, possibly even surpassing current projections for the next decades. Considering this scenario, the necessity of implementing a multi-sectoral response to tackle this ailment becomes evident. **Objective(s):** The purpose of this study is to evaluate the prevalence of diabetes mellitus, along with its respective risk factors and associated complications, among the population previously seen at an outpatient clinic. **Methods:** This is an observational, analytical, quantitative study based on retrospectively collected data from the medical records of patients diagnosed with diabetes mellitus who were treated in an outpatient clinic between August 2019 and August 2022. **Results:** In a sample of 231 participants, 159 were female and 76 were male, with a mean age of 61.6 years. Among them, 75 had a family history of DM, 128 patients had Systemic Arterial Hypertension, 60 patients were overweight or obese, 87 were sedentary, 80 had dyslipidemia, and 28 had complications resulting from DM. **Conclusion:** In conclusion, the study findings indicate a higher prevalence of DM among female patients and a significant association between the disease and its complications with factors such as hypertension, family history, age, dyslipidemia, sedentary lifestyle, overweight, and obesity. The most prevalent complication observed was diabetic neuropathy. Hence, it is imperative to enhance population awareness regarding the significance of regular outpatient monitoring and laboratory tests. This initiative aims to effectively manage DM and mitigate the risk of future complications from DM and other associated diseases.

Keywords: Diabetes Mellitus; Diabetes Complications; Risk Factors.

INTRODUCTION

Diabetes mellitus (DM) is a non-communicable chronic disease (NCD) characterized by a heterogeneous group of metabolic disorders resulting in elevated blood glucose levels over an extended period of time[1]. Two mechanisms have been proposed to explain the pathogenesis of the disease: the first, used to describe the origin of type 1 diabetes mellitus, involves the destruction of pancreatic β cells, resulting in insufficient insulin production, which in turn leads to impaired glucose entry into cells and consequently increased serum glucose levels. The

second mechanism, which may describe type 2 diabetes mellitus, is based on peripheral resistance of cells to insulin action, resulting in its insufficient ability to promote glucose entry from the bloodstream, leading to elevated blood glucose levels[2].

DM is an extremely relevant public health problem and is recognized as one of the most common chronic diseases in virtually every country worldwide. In the year 2000, the estimated number of adults living with diabetes was 151 million; by 2009, this number increased by 88% to reach 285 million[3]. Global estimates of DM prevalence in 2019 indicate that 463 million people live with the disease, which could rise to 578 million by 2030 and 700 million by 2045[4]. It is important to note that a decade ago, in 2010, the projection for diabetes in 2025 was 438 million, by 2019, with just over 5 years left until 2025, the forecast had already been exceeded by 25 million[3]. Prevalence is higher in urban areas than in rural areas and is also higher in countries where individuals have high monthly incomes than in countries where monthly incomes are low. Additionally, it is estimated that approximately 50.1% of diabetics are unaware that they have the disease[4].

Diabetes mellitus not only poses a significant burden of morbidity and mortality but also escalates the risk of untimely death. The International Diabetes Federation (IDF) estimates that approximately 4.2 million adults died in 2019, equivalent to one death every 8 seconds[3]. It is estimated that 5.1 million people aged 20 to 79 died from diabetes-related causes in 2013, and by 2030, DM may rise from the ninth to the seventh leading cause of death worldwide[5]. Besides the significant mortality associated with DM, it also heightens the risk of health complications, frequently stemming from uncontrolled or poorly controlled DM. However, even individuals who maintain good DM control are not exempt from the possibility of developing complications. The most prevalent chronic complications of DM include diabetic retinopathy (its prevalence increases with the duration of type 1 and 2 diabetes mellitus), cardiovascular diseases (DM accounts for between half and one-third of all deaths from cardiovascular diseases and doubles the risk of cardiovascular diseases), chronic kidney disease, and diabetic neuropathy[3].

In Brazil, the disease also represents a significant health problem. In 2013, Brazil ranked fourth among countries with the highest number of diabetic individuals, totaling 11.9 million cases among adults aged 20 to 79[5]. According to the National Health Survey (PNS) in 2013, the prevalence of self-reported DM in Brazilians aged 18 years and older was 6.2%, with 7% in women and 5.4% in men[6].

The importance of the disease as the leading cause of mortality and premature disability in affected individuals has increased in most developing countries, including Brazil[7]. Due to the complications associated with diabetes, there is an increased demand for healthcare services. The prolonged course of the disease is reflected in higher medication usage, particularly among the elderly, and exacerbation of symptoms leading to limitations in daily activities, and its significant social impact[8]. DM can significantly affect individuals' quality of life, with an estimated 89 million disability-adjusted life years (DALYs) lost worldwide[9].

Several factors are associated with the disease[3], and health promotion measures, such as guidance on physical activity (along with the creation of facilities for physical activity in public squares in some cities) and guidance on proper diet, have been implemented in the country in recent years to contain the progression of this chronic disease[7].

The growing prevalence of diabetes mellitus is not only a phenomenon observed in Brazil but worldwide.

It is attributed to a complex interplay of interconnected socioeconomic, demographic, environmental, and genetic factors. The continuous increase in numbers is largely due to the rise of type 2 DM and its risk factors, which include aging populations, increasing prevalence of obesity and sedentary lifestyles, unhealthy diets, and urbanization processes, considered the main factors responsible for the increasing incidence and prevalence of DM worldwide3. Due to its numerous comorbidities and complications, DM affects the social and occupational lives of affected individuals and incurs indirect and direct costs to patients, healthcare systems, and society[9]. Some researchers estimated that diabetes mellitus accounted for 12.0% of total non-pregnancy-related hospitalizations and up to 15.4% of hospital costs in the Brazilian Unified Health System (SUS) between 2008 and 2010[10].

Given this panorama, it is evident that a multi-sectoral response is needed to deal with this disease, which, if more effective prevention and control measures are not adopted, will continue to cause significant social and economic losses at personal and community levels nationally[3]. This multi-sectoral response involves prioritizing care and control of diabetes mellitus through initiatives that enable public awareness and healthcare professionals about DM symptoms, with the aim of early disease detection. In addition, this response encompasses the implementation of a national development plan to mitigate the impact of diabetes, as well as health promotion programs that aim to reduce barriers to accessing medications and technological equipment, including glucose meters, and promoting lifestyle changes, including a more balanced diet, and increased physical activity among the entire population of Brazil. The last multi-sectoral measure concerns promoting high-quality methodological research on diabetes mellitus, as government or private foundations providing funding for such research will lead to a better understanding of the measures necessary to deal with the increasing prevalence of type 1 and 2 diabetes.

The primary objective of this research project is to investigate the impact of associated risk factors on the development and progression of diabetes mellitus, including the emergence of potential complications. This will be achieved by analyzing the prevalence of relevant data within the studied population. The main hypothesis posits a relationship between the onset and maintenance of the clinical presentation of DM and its associated risk factors. It further suggests that patients with these risk factors will experience a higher frequency of complications associated with DM. Conversely, the alternative hypothesis proposes no relationship between the onset and maintenance of the clinical picture of DM with the evaluated risk factors or the occurrence of complications.

METHOD

Study type

This was an observational, analytical, quantitative study based on data collected retrospectively from the medical records of patients diagnosed with diabetes mellitus who had been treated at an Outpatient Clinic in Minas Gerais.

Participants

The sample consisted of patients diagnosed with diabetes mellitus, of both genders, who had attended at least one appointment at an Outpatient Clinic in Minas Gerais between August 2019 and August 15, 2022.

The inclusion criteria were: patients of both sexes, diagnosed with insulin-dependent diabetes mellitus (identified by ICD 10–E10 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mellitus–with coma (identified by ICD 10–E100 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mel-

litus–with ketoacidosis (identified by ICD 10–E101 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mellitus–with renal complications (identified by ICD 10–E102 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mellitus–with ophthalmic complications (identified by ICD 10–E103 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mellitus–with neurological complications (identified by ICD 10–E104 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mellitus–with peripheral circulatory complications (identified by ICD 10–E105 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mellitus–with other specified complications (identified by ICD 10–E106 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mellitus–with multiple complications (identified by ICD 10–E107 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mellitus–with unspecified complications (identified by ICD 10–E108 in the medical records at an outpatient clinic in Minas Gerais), insulin-dependent diabetes mellitus–without complications (identified by ICD 10–E109 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus (identified by ICD 10–E11 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–with coma (identified by ICD 10–E110 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–with ketoacidosis (identified by ICD 10–E111 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–with renal complications (identified by ICD 10–E112 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–with ophthalmic complications (identified by ICD 10–E113 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–with neurological complications (identified by ICD 10–E114 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–with peripheral circulatory complications (identified by ICD 10–E115 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–with other specified complications (identified by ICD 10–E116 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–with multiple complications (identified by ICD 10–E117 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–with unspecified complications (identified by ICD 10–E118 in the medical records at an outpatient clinic in Minas Gerais), non-insulin-dependent diabetes mellitus–without complications (identified by ICD 10–E119 in the medical records at an outpatient clinic in Minas Gerais), malnutrition-related diabetes mellitus (identified by ICD 10–E12 in the medical records at an outpatient clinic in Minas Gerais), malnutrition-related diabetes mellitus–with coma (identified by ICD 10–E120 in the medical records at an outpatient clinic in Minas Gerais), Diabetes mellitus related to malnutrition–with ketoacidosis (identified by ICD 10–E121 in the medical records at an outpatient clinic in Minas Gerais), diabetes mellitus related to malnutrition–with renal complications (identified by ICD 10–E122 in the medical records at an outpatient clinic in Minas Gerais), diabetes mellitus related to malnutrition–with ophthalmic complications (identified by ICD 10–E123 in the medical records at an outpatient clinic in Minas Gerais), diabetes mellitus related to malnutrition–with neurological complications (identified by ICD 10–E124 in the medical records at an outpatient clinic in Minas Gerais), diabetes melli-

tus related to malnutrition–with peripheral circulatory complications (identified by ICD 10–E125 in the medical records at an outpatient clinic in Minas Gerais), diabetes mellitus related to malnutrition–with other specified complications (identified by ICD 10–E126 in the medical records at an outpatient clinic in Minas Gerais), diabetes mellitus related to malnutrition–with multiple complications (identified by ICD 10–E127 in the medical records at an outpatient clinic in Minas Gerais), diabetes mellitus related to malnutrition–with unspecified complications (identified by ICD 10–E128 in the medical records at an outpatient clinic in Minas Gerais), diabetes mellitus related to malnutrition–without complications (identified by ICD 10–E129 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus (identified by ICD 10–E13 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–with coma (identified by ICD 10–E130 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–with ketoacidosis (identified by ICD 10–E131 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–with renal complications (identified by ICD 10–E132 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–with ophthalmic complications (identified by ICD 10–E133 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–with neurological complications (identified by ICD 10–E134 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–with peripheral circulatory complications (identified by ICD 10–E135 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–with other specified complications (identified by ICD 10–E136 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–with multiple complications (identified by ICD 10–E137 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–with unspecified complications (identified by ICD 10–E138 in the medical records at an outpatient clinic in Minas Gerais), other specified types of diabetes mellitus–without complications (identified by ICD 10–E139 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus (identified by ICD 10–E14 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–with coma (identified by ICD 10–E140 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–with ketoacidosis (identified by ICD 10–E141 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–with renal complications (identified by ICD 10–E142 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–with ophthalmic complications (identified by ICD 10–E143 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–with neurological complications (identified by ICD 10–E144 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–with peripheral circulatory complications (identified by ICD 10–E145 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–with other specified complications (identified by ICD 10–E146 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–with multiple complications (identified by ICD 10–E147 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–with unspecified complications (identified by ICD 10–E148 in the medical records at an outpatient clinic in Minas Gerais), unspecified diabetes mellitus–without com-

plications (identified by ICD 10–E149 in the medical records at an outpatient clinic in Minas Gerais), and who attended at least one consultation at ACM-MG between August 2019 and August 2022. The exclusion criteria were: all patients not identified in their respective medical records by the ICD–10 of the inclusion criteria during consultations at an outpatient clinic in Minas Gerais. Patients who were attended to before August 2019 and after August 2022 at an outpatient clinic in Minas Gerais.

Instruments and Procedures

Data collection was conducted between November 2022 and July 2023, through the research, selection, and evaluation of medical records dated between August 2019 and August 15, 2022, using the outpatient management system–MV–used at an outpatient clinic in Minas Gerais, after approval from the Research Ethics Committee of the Medical Sciences Faculty of Minas Gerais (CEPCM-MG).

The search was performedusing the ICD-10 in the local system, thus filtering patients with insulin-dependent diabetes mellitus and its variations, non-insulin-dependent diabetes mellitus and its variations, diabetes mellitus related to malnutrition and its variations, and other specified types of diabetes mellitus and its variations.

After filtering in the system by ICD-10, some data were individually collected from each medical record: gender, age, family history, arterial hypertension, obesity, overweight, sedentary lifestyle, dyslipidemia, chronic diseases, complications arising from DM, classes of medications used for DM treatment, and fasting blood glucose and glycated hemoglobin data that were recorded in the last medical record. For this, the authors developed a Data Collection Table (Appendix A) to be used in each analyzed medical record. Data storage was done in an Excel spreadsheet, with access permitted only to the research authors.

In the data analysis, the population was initially categorized into three groups: individuals diagnosed with DM but without risk factors or DM-related complications, patients diagnosed with DM and having risk factors but without DM-related complications, and patients diagnosed with DM having both risk factors and DM-related complications. A comparative table was created, demonstrating the presence or absence of the interrelationship between the onset and maintenance of diabetes mellitus with the other evaluated risk factors and possible complications of DM.

Ethical Aspects

This study was approved by the Research Ethics Committee of the Medical Sciences Faculty of Minas Gerais under opinion number 5,654,717 (CAAE number–62283922.5.0000.5134). The work complied with Resolution 466/12 of the CNS-MS regarding confidentiality and personal information of the subjects involved, committing not to disclose names, initials, images, or any data that could enable their identification.

Data Analysis

For the characterization of qualitative variables, simple frequencies and percentage frequencies were used. For the characterization of quantitative variables, the median and interquartile range were used. For the association test between qualitative variables, the Fisher's Exact Test was used with a significance level of 0.05 or a Chi-square Test of independence. To verify the equality between the medians of quantitative variables, the Kruskal-Wallis Test and the Wilcoxon test for variables that do not have a normal distribution were used.

RESULTS

An analysis of 231 medical records revealed that the most prevalent gender in the studied population was female, representing 68% of the sample, with a total of 157 patients. This could be associated with the fact that women tend to seek healthcare services more than men. The median age was 63 years, with the lower quartile presenting a cutoff age of 56 years, and the upper quartile presenting a cutoff age of 72 years. This older age is expected since type 2 diabetes mellitus (DM2) is a chronic disease, and its systemic effects take time to manifest, leading patients to seek healthcare services at more advanced ages.

The most frequent ICD code was E11 (Non-Insulin-Dependent Diabetes Mellitus), recorded in 166 medical records, corresponding to 72% of the total sample. A positive family history of diabetes mellitus was observed in 73 patients, within a group of 142 patients with this record in the medical records, as it is known that the disease is associated with genetic factors. Out of 170 evaluated patients, 128 had Systemic Arterial Hypertension (SAH) I or SAH II. Regarding obesity, 43 out of 67 patients with this record were classified as at least Grade I Obesity, and out of 126 evaluated patients regarding physical activity, 85 were sedentary. The most prevalent chronic diseases were SAH and dyslipidemia, highlighting the association of other non-communicable chronic diseases with DM2.

Among the 28 patients with complications, Diabetic Neuropathy was the most frequent, with 12 cases recorded. Regarding medications, metformin and sulfonylureas were the most used, mainly due to their high availability in the public healthcare system.

Table 1–Sample Characterization

Clinical, Laboratory, and Lifestyle Characteristics of the Studied Population.

Characteristics	N = 231
ICD	
E10	28 (12%)
E102	2 (0.9%)
E109	5 (2.2%)
E11	166 (72%)
E119	3 (1.3%)
E14	22 (9.5%)
E149	5 (2.2%)
Gender	
Female	157 (68%)
Male	74 (32%)
Age	63 (56, 72)
Family History of Diabetes Mellitus	
YES	69 (30%)
NO	73 (32%)
Unknown	89 (39%)
Normal Blood Pressure	
NO	170 (74%)
YES	43 (19%)
Unknown	18 (7.8%)
Pre-hypertension	
NO	171 (74%)
YES	42 (18%)
Unknown	18 (7.8%)
Hypertension Type I	
NO	145 (63%)
YES	68 (29%)
Unknown	18 (7.8%)
Hypertension Type II	
NO	153 (66%)
YES	60 (26%)
Unknown	18 (7.8%)
Normal Weight	
NO	60 (26%)
YES	7 (3.0%)
Unknown	164 (71%)

Overweight	
NO	50 (22%)
YES	17 (7.4%)
Unknown	164 (71%)
Obesity I	
NO	42 (18%)
YES	25 (11%)
Unknown	164 (71%)
Obesity II	
NO	56 (24%)
YES	11 (4.8%)
Unknown	164 (71%)
Obesity III	
NO	61 (26%)
YES	7 (2.7%)
Unknown	164 (71%)
Sedentary Lifestyle	
NO	41 (18%)
YES	85 (37%)
Unknown	105 (45%)
Dyslipidemia	
NO	72 (31%)
YES	80 (35%)
Unknown	79 (34%)
Chronic Diseases	
NO	10 (4.3%)
YES	217 (94%)
Unknown	4 (1.7%)
Chronic Diseases–Depression	
NO	210 (91%)
YES	21 (9.1%)
Chronic Diseases–Systemic Arterial Hypertension	
NO	41 (18%)
YES	190 (82%)
Chronic Diseases–Dyslipidemia	
NO	103 (45%)
YES	128 (55%)
Chronic Diseases–Bronchitis	
NO	226 (98%)
YES	5 (2.2%)
Chronic Diseases–Hypothyroidism	
NO	209 (90%)
YES	22 (9.5%)
Chronic Diseases–Heart Disease	
NO	212 (92%)
YES	19 (8.2%)
Chronic Diseases–Unespecified	
NO	214 (93%)
YES	17 (7.4%)
Diabetes Mellitus Complications	
NO	193 (84%)
YES	28 (12%)
Unknown	10 (4.3%)
Diabetic Neuropathy	
NO	219 (95%)
YES	12 (5.2%)
Diabetic Foot	
NO	228 (99%)
YES	3 (1.3%)
Complications of DM – NO	
NO	38 (16%)
YES	193 (84%)
Diabetic Retinopathy	
NO	226 (98%)
YES	5 (2.2%)
Diabetic Nephropathy	
NO	224 (97%)
YES	7 (3.0%)
Treatment with Biguanides	
NO	23 (10.0%)
YES	198 (86%)
Unknown	10 (4.3%)
Treatment with Sulfonylureas	
NO	173 (75%)
YES	48 (21%)
Unknown	10 (4.3%)
Treatment with Thiazolidinediones	
NO	220 (95%)
YES	1 (0.4%)
Unknown	10 (4.3%)

Treatment with Alpha-glucosidase Inhibitors	
NO	221 (96%)
YES	0 (0%)
Unknown	10 (4.3%)
Treatment with Meglitinides	
NO	221 (96%)
YES	0 (0%)
Unknown	10 (4.3%)
Treatment with DPP-4 Inhibitors	
NO	220 (95%)
YES	1 (0.4%)
Unknown	10 (4.3%)
Treatment with SGLT2 Inhibitors	
NO	218 (94%)
YES	3 (1.3%)
Unknown	10 (4.3%)
Treatment with GLP1 Agonists	
NO	221 (96%)
YES	0 (0%)
Unknown	10 (4.3%)
Treatment with Insulin	
NO	180 (78%)
YES	42 (18%)
Unknown	9 (3.9%)
Fasting Blood Glucose 70-99	
NO	139 (60%)
YES	23 (10.0%)
Unknown	69 (30%)
Fasting Blood Glucose 100-125	
NO	124 (54%)
YES	38 (16%)
Unknown	69 (30%)
Fasting Blood Glucose 126-150	
NO	121 (52%)
YES	41 (18%)
Unknown	69 (30%)
Fasting Blood Glucose 151-175	
NO	135 (58%)
YES	27 (12%)
Unknown	69 (30%)
Fasting Blood Glucose 176-200	
NO	153 (66%)
YES	9 (3.9%)
Unknown	69 (30%)
Fasting Blood Glucose 200	
NO	138 (60%)
YES	24 (10%)
Unknown	69 (30%)
HbA1c less than or equal to 5,6%	
NO	144 (62%)
YES	4 (1.7%)
Unknown	83 (36%)
Hb1Ac from 5,7% to 6,4%	
NO	100 (43%)
YES	48 (21%)
Unknown	83 (36%)
Hb1Ac from 6,5% to 8%	
NO	83 (36%)
YES	65 (28%)
Unknown	83 (36%)
Hb1Ac less than or equal to 8,1%	
NO	119 (52%)
YES	29 (13%)
Unknown	83 (36%)

The most prevalent range of Fasting Blood Glucose was between 100 to 150, while the most common range of Hemoglobin A1c (HbA1c) was from 5.7% to 8%. It was observed that 42% of patients using insulin did not have good control according to Fasting Blood Glucose, and 41% were not well controlled according to the HbA1c test. These findings highlight the necessity for heightened vigilance and treatment modifications to enhance glycemic control among this population.

Table 2–Relationship between Insulin use and Fasting Blood Glucose and HbA1c
Insulin use and Diabetes Control through Fasting Blood Glucose and HbA1c Tests.

Characteristics	Total (N=231)	Non-Insulin Users (N=180)	Insulin Users (N=42)	Unknown (N=9)	P-value
Fasting Blood Glucose 70-99					0.2
NO	139 (100%)	109 (78%)	24 (-17%)	6 (4.3%)	
YES	23 (100%)	22 (96%)	1(4.3%)	0 (0%)	
Unknown	69 (100%)	49 (71%)	17 (25%)	3 (4.3%)	
Fasting Blood Glucose 100-125					0.2
NO	124 (100%)	100 (81%)	21 (17%)	3 (2.4%)	
YES	38 (100%)	31 (82%)	4 (11%)	3 (7.9%)	
Unknown	69 (100%)	49 (71%)	17 (25%)	3 (4.3%)	
Fasting Blood Glucose 126-150					0.2
NO	121 (100%)	94 (78%)	22 (18%)	5 (4.1%)	
YES	41 (100%)	37 (90%)	3 (7.3%)	1 (2.4%)	
Unknown	69 (100%)	49 (71%)	17 (25%)	3 (4.3%)	
Fasting Blood Glucose 151-175					0.5
NO	135 (100%)	109 (81%)	21 (16%)	5 (3.7%)	
YES	27 (100%)	22 (81%)	4 (15%)	1 (3.7%)	
Unknown	69 (100%)	49 (71%)	17 (25%)	3 (4.3%)	
Fasting Blood Glucose 176-200					0.078
NO	153 (100%)	126 (82%)	22 (14%)	5 (3.3%)	
YES	9 (100%)	5 (56%)	3 (33%)	1 (11%)	
Unknown	69 (100%)	49 (71%)	17 (25%)	3 (4.3%)	
Fasting Blood Glucose above 200					0.003
NO	138 (100%)	117 (85%)	15 (11%)	6 (4.3%)	
YES	24 (100%)	14 (58%)	10 (42%)	0 (0%)	
Unknown	69 (100%)	49 (71%)	17 (25%)	3 (4.3%)	
HbA1c less than or equal to 5.6%					0.039
NO	144 (100%)	117 (81%)	25 (17%)	2 (1.4%)	
YES	4 (100%)	3 (75%)	0 (0%)	1 (25%)	
Unknown	83 (100%)	60 (72%)	17 (20%)	6 (7.2%)	
HbA1c from 5.7% to 6.4%					0.004
NO	100 (100%)	74 (74%)	23 (23%)	3 (3.0%)	
YES	48 (100%)	46 (96%)	2 (4.2%)	0 (0%)	
Unknown	83 (100%)	60 (72%)	17 (20%)	6 (7.2%)	

Hb1Ac from 6,5% to 8%					0.3
NO	83 (100%)	67 (81%)	15 (18%)	1 (1.2%)	
YES	65 (100%)	53 (82%)	10 (15%)	2 (3.1%)	
Unknown	83 (100%)	60 (72%)	17 (20%)	6 (7.2%)	
Hb1Ac greater than or equal to 8,1%					0.001
NO	119 (100%)	103 (87%)	13 (11%)	3 (2.5%)	
YES	29 (100%)	17 (59%)	12 (41%)	0 (0%)	
Unknown	83 (100%)	60 (72%)	17 (20%)	6 (7.2%)	

DISCUSSION

The present study conducted an analysis of a representative sample of patients with Diabetes Mellitus (DM), aiming to thoroughly understand the interconnection between risk factors and complications associated with this comorbidity. The data obtained reveal a clinically complex landscape, emphasizing the urgent need for the implementation of multifaceted approaches for effective DM management[11].

The predominance of female patients in the studied sample coincides with the epidemiological trends observed in the Brazilian context[12]. Gender disparity in diabetes prevalence may be intrinsically related to hormonal factors, such as insulin resistance during menopause[13], or the fact that men tend to seek healthcare services less than women[14]. It is worth noting that the finding of a 32% prevalence of patients with a family history of DM underscores the substantial impact of genetic factors on this condition, thereby emphasizing the significance of evaluating hereditary risks.

The high incidence of alterations in blood pressure, recorded in 74% of patients during medical consultations, associated with the diagnosis of Systemic Arterial Hypertension (SAH) in 82% of cases, evidences the inextricable connection between DM and hypertension. Studies, such as Emdin et al. (2019), highlight that strict blood pressure control is vital for reducing cardiovascular and renal complications in diabetic patients[15]. Additionally, the close correlation between hypertension prevalence and increased albuminuria is widely recognized, indicating an association between uncontrolled blood pressure and diabetic nephropathy[16].

The significant prevalence of cardiovascular complications, including diabetic neuropathy, diabetic foot, diabetic retinopathy, and diabetic nephropathy, underscores the imperative of implementing integrated patient-focused strategies to mitigate such complications[17]. These strategies encompass maintaining good glycemic control, regulating blood pressure, managing risk factors like hypercholesterolemia, and making lifestyle modifications such as improving diet and combating sedentary behavior along with patient education about their condition and the importance of maintaining control of these habits, together with appropriate pharmacological treatment[18].

The finding that 26% of patients were overweight or obese, coupled with the fact that 90% of patients with documented weight fell into this category, unequivocally highlights the direct relationship between obesity and DM. Studies, such as those conducted by Lean, Michael E J et al. (2019), emphasize that lifestyle modification, including weight control, plays a crucial role in DM prevention[19]. Furthermore, the prevalence of sedentary behavior in 37% of patients

underscores the importance of strategies aimed at promoting physical activity, considering obesity as a highly important risk factor for the onset of diabetes[20].

The presence of dyslipidemia in 35% of patients emphasizes the metabolic implications associated with DM. Specialized literature suggests that adequate lipid control is essential to attenuate vascular complications related to DM[21].

Most patients were treated with biguanides (86%), while a smaller proportion used sulfonylureas (21%). This panorama reflects the emphasis placed by current guidelines on the use of metformin as first-line therapy[22]. However, the identification of patients who are not yet adequately controlled emphasizes the urgent need for constant evaluation and consideration of alternative therapies, as suggested by recent studies on the use of SGLT2 inhibitors and GLP-1 agonists[23].

The inherent limitations of this study stem from the lack of information in the medical records of the selected sample, including variables such as body mass index (BMI), weight, family history, and physical activity practice. It should be noted that these data gaps exist in a substantial portion of the sample. Additionally, the incorrect completion of the ICD-10 fields, with specified subtypes of diabetes different from the type of diabetes diagnosed in the patient, represents another limitation of the study. Furthermore, the lack of data in the outpatient system before August 2019 resulted in a smaller population sample than initially targeted.

This scenario underscores the pressing need for a standardized approach to clinical documentation, aimed at enhancing data collection for future research. One potential strategy involves mandating that medical records containing any DM-related information must be completed in full before closure. Furthermore, future research could delve into exploring the interplay between socioeconomic factors, quality of life, and treatment adherence, thereby providing a holistic understanding of the challenges encountered by individuals with DM.

CONCLUSION

The complexity of Diabetes Mellitus (DM) is emphasized emphatically, elucidating the interactive dynamics between inherent risk factors and complications associated with this metabolic condition. Notwithstanding the limitations inherent to the scope of the research, the data compiled by us corroborate the assertion of a higher prevalence of diabetes in female patients, establishing a notable association between the mentioned pathology and its complications, namely: systemic arterial hypertension, family history, age group, dyslipidemia, and adherence to a predominantly sedentary lifestyle. Of relevance is the finding that diabetic neuropathy is the most common complication, and its progression to diabetic foot, consequently, was shown to be more prominent among male patients.

Considering this scenario, the adoption of integrated therapeutic approaches becomes imperative, incorporating not only substantial lifestyle modifications but also the meticulous control of blood pressure, vigilant monitoring of lipid levels, and ongoing evaluation of treatment efficacy. Such strategies emerge as fundamental for optimizing DM management, providing a comprehensive and multifaceted approach.

In this context, the significance of continuous research is underscored, serving as a vital cornerstone for the continual evolution and advancement of strategies in preventing and treating DM. This investigative approach is indispensable for substantially enhancing the quality of life for patients confronting the challenges presented by this prevalent metabolic condition.

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THE AUTHORS DECLARE THAT THERE IS NO CONFLICT OF INTERESTS IN RELATION TO THIS ARTICLE.