JHGD
Journal of Human Growth and Development

www. jhgd.com.br

ORIGINAL ARTICLE

Prevalence of diabetic foot and its risk factors in the State of Espirito Santo, Brazil

Wendel Jose Teixeira Costa[a,b,c,d], Luiz Carlos de Abreu[a,b,c,e,g], Thaiany Pedrozo Campos Antunes[b,c], José Lucas Souza Ramos[a,b,c], Jonathan Mende de Castro[d], João Batista Francalino da Rocha[c,e], Nilson Penha-Silva[h], Italla Maria Pinheiro Bezerra[a,b,c,e,f]

Open acess

[a]Programa de Mestrado em Políticas Públicas e Desenvolvimento Local, Escola Superior de Ciências da Santa Casa de Misericórdia (EMESCAM), Vitória/ Espírito Santo, 29045-402, Brasil.

[b]Laboratório de Escrita Científica, Escola Superior de Ciências da Santa Casa de Misericórdia (EMESCAM), Vitória/ Espírito Santo, 29045-402, Brasil.

[c]Laboratório de Delineamento de Estudos e Escrita Científica, Centro Universitário FMABC, Convênio Acre/ FMABC-007/2015, Santo André/ São Paulo, 09060-870, Brasil.

[d]Laboratório de Escrita Científica, Centro Universitário de Caratinga(UNEC), Caratinga/ Minas Gerais, 35300-345, Brasil.

[e]Universidade Federal do Acre (UFAC), Rio Branco/ Acre, 69.915-900, Brasil.

[f]Programa de Mestrado em Ciências da Saúde da Amazônia, Bolsista CAPES Brasil, Universidade Federal do Acre (UFAC), Rio Branco/ Acre, 69.915-900, Brasil.

[g]Graduate Entry Medical School, University of Limerick, Limerick, V94 T9PX, Ireland.

[h]Universidade Federal de Uberlânida. Instituto de Biotecnologia. Uberlândia, Minas Gerais, Brasil.

Corresponding author
luiz.abreu@emescam.br

Manuscript received: may 2022
Manuscript accepted: december 2022
Version of record online: march 2023

Abstract

Introduction: Diabetic Foot (DF) is the leading cause of non-traumatic amputations in Western countries, causing death or physical and mental disability, poor quality of life and high cost to society.

Objetive: To analyze the prevalence of DF and related risk factors in the diabetic population residing in Espírito Santo State, Brazil.

Methods: Cross-sectional, descriptive study with time series design, using secondary data on morbidity of individuals with DF living in the State of Espírito Santo, registered and followed by the Hypertensive and Diabetic Registration and Monitoring System.

Results: From 64,196 diabetic patients, 3.9% had Type 1 DM, 10.9% Type 2 DM and 85.2% had hypertension. The prevalence of DF was 2.9% in type 1 DM, 3.3% in type 2 DM and 4.5% in DM with hypertension. Higher rates of DF were observed in males, aged over 60 years in type 1 and type 2 DM, and up to 19 years in DM with hypertension, smoking, sedentary lifestyle, Acute Myocardial Infarction (AMI), stroke and Cronic Kidney disease (CKD). In overweight individuals, the prevalence of DF was higher only in type 1 DM. There was a significant association in all variables except overweight in both types of DM, sedentary lifestyle and stroke in type 1 DM.

Conclusion: Findings showed important prevalence of DF, with higher concentration in men older than 60 years, on smoking, sedentary lifestyle, AMI, stroke and CKD, with significant statistical association in the analized variables, except for overweight in both types of DM, as well as sedentary lifestyle and stroke in type 1 DM.

Keywords: diabetes mellitus, diabetic foot, prevalence epidemiology.

Suggested citation: Costa WJT, Abreu LC, Antunes TPC, Souza JL, de Castro JM, Rocha JBF, Penha-Silva N, Bezerra IMP. Prevalence of diabetic foot and its risk factors in the State of Espirito Santo, Brazil. *J Hum Growth Dev. 2023; 33(1):33-43.* DOI: http://doi.org/10.36311/jhgd.v33.14295

Authors summary

Why was this study done?
To analyze the prevalence of diabetic foot and related risk factors in the diabetic population, in Espírito Santo State, in Brazil.

What did the researchers do and find?
A Cross-sectional, descriptive study with time series design, using secondary data was done. The prevalence of foot ulcers affects 4% to 10% of people with DM. About 40% to 60% of non-traumatic lower limb amputations occur in these patients and 85% of them are preceded by foot ulcers. Being male, older than 60 years, smoker, with sedentary lifestyle, acute myocardial infarction, stroke and chronic kidney disease were considered risk factors for diabetic foot. Overweight in both types of Diabetes, as well as sedentary lifestyle and stroke in type 1 Diabetes were not associated to diabetic foot.

What do these findings mean?
Knowing the risk factors for diabetic foot can guide health care to prevent this condition in diabetic patients in treatment.

Highlights

To analyze the prevalence of diabetic foot and related risk factors in the diabetic population, in Espírito Santo State, in Brazil, a Cross-sectional, descriptive study with time series design, using secondary data was done. Being males, older than 60 years, smoker, with sedentary lifestyle, acute myocardial infarction, stroke and chronic kidney disease were considered risk factors for diabetic foot. Overweight in both types of Diabetes, as well as sedentary lifestyle and stroke in type 1 Diabetes were not associated to diabetic foot.

INTRODUCTION

In 2017, the prevalence of Diabetes Mellitus (DM) was estimated at 8.8% of the world population aged 20 to 79 years, totaling approximately 425 million people, with a tendency of 9.9% for the year 2045 and may reach 628.6 million citizens worldwide. It has stood out among the most growing and important public health problems, being among the top ten causes of death worldwide[1].

Persistent hyperglycemia results in tissue damage and complications in the kidneys, eyes, nerves and peripheral vascular system are common. The main complications of DM are diabetic retinopathy, diabetic neuropathy, nephropathy, peripheral arterial disease, coronary heart disease, cerebrovascular disease, and diabetic foot syndrome[2].

Within the group of complications of DM involving the cardiovascular system, hypertension is highlighted, which occurs as a result of changes in autonomic function and the damage that DM causes in the organs, leading diabetic patients to present greater variability of blood pressure and a difficulty in reducing nocturnal blood pressure values[3].

Among the changes, diabetic foot ulcers and associated amputations are the most common complications, producing disability and increasing care costs[4,5].

The term diabetic foot (DF) refers to any foot injury in people with DM, such as infection, ulcer, tissue destruction, which appears as a result of disease complications[6]. It is the leading cause of non-traumatic amputations in Western countries, which can cause death or physical and mental disability, negatively affecting quality of life and representing a high cost to society[7,8].

The development of DF is directly related to the duration of DM and consequently with age, therefore, delayed diagnosis and initiation of appropriate treatment increases the occurrence of complications and eventually amputations[9].

It is estimated that approximately 15% of DM patients will have lifelong lower extremity ulcers and between 17 and 20% of them will have some type of amputation[10].

The prevalence of foot ulcers affects 4% to 10% of people with DM. About 40% to 60% of non-traumatic lower limb amputations occur in these patients and 85% of them are preceded by foot ulcers[9,11].

From this perspective, it becomes evident the need for commitment by government leaders and health managers to create mechanisms that minimize the onset, as well as the aggravation of DM[2].

These efforts should be directed to both the reorganization of care for people with DM and the provision of necessary inputs for disease management, in order to reduce the costs arising from early non-detection and complications related to lack of metabolic control[12].

In Brazil, Primary Health Care follows the principles of universality, accessibility, bond, continuity of care, comprehensive care, accountability, humanization, equity and social participation. We highlight the care model of the Family Health Strategy (FHS), which is based on the work of multiprofessional teams. The service is focused on local reality and the needs of the population, with the main objective of bringing families closer to the health service, facilitating access and strengthening bond[13].

Gathering data on DM complications can attract the attention of public authorities, enabling effective and rapid action, focused at the local level, with expanded potential, to focus efforts on the worst conditions identified. This favors the rationalization of resources for high, medium and low complexity in health care. With this knowledge, measures can be rationally chosen to face the problems in professional practice, increasing the chances of their resolution.

Based on previous statements , the present study aimed to analyze the prevalence of DF and related risk factors in the diabetic population residing in Espírito Santo State, Brazil.

METHODS

Study Design

This is a descriptive cross-sectional study[14], using a time series design and the use of secondary data on the morbidity of individuals with diabetes and DF living in the

State of Espírito Santo, Brazil, registered and followed by the Hypertensive Registration and Monitoring Diabetics System (SIS-Hiperdia).

Study Location and Period

Data were collected by place of residence of individuals registered in the system. The unit of analysis selected for this study was the State of Espírito Santo. The data corresponded to the period between 2003 and 2012.

Study Population, Inclusion and Exclusion Criteria

All individuals with type 1 DM, type 2 DM and DM with concomitant arterial hypertension, residing in the state of Espírito Santo, registered and followed by the SIS-Hiperdia, notified and included with PD and DM amputations from 2003 to 2012

No individuals were excluded from the sample.

Individuals reported on SisHiperdia as Concomitant Hypertension Diabetics are not extratified by Type of Diabetes (Type 1 DM or Type 2 DM).

Data collection

Data were extracted from the SIS-Hiperdia, which is a program from the Department of Informatics of the Unified Health System - DATASUS, website: www.datasus.gov.br , then two independent researchers organized the data in a file of Microsoft® Office softwear spreadsheets. Excel version 15.0 to identify possible discrepancies.

An exploratory analysis was performed to recognize variables and correct possible errors or inconsistencies in data entry. Once the necessary corrections were made, the data were organized and analyzed, applying descriptive statistics.

SIS-Hiperdia is a program established by the Ministry of Health in 2002, as part of the Reorganization Plan for Arterial Hypertension and Diabetes Mellitus Care, consolidating itself as a platform for registration and monitoring of patients with hypertension and/or DM, assisted by the teams of Primary Care of the Unified Health System (SUS).

This tool generates public information with the exception of name of patient available for Ministry of Health, health professionals and managers of municipal and state departments allowing to know the epidemiological profile of hypertension and DM in the population[15].

Thorough this systemit is possible to investigate whether the population at risk is being adequately assisted, to know the demographic and epidemiological profile of the affected community, to verify the prevalence of risk factors, concomitant diseases and complications, monitor the clinical quality of care provided and know parameters of the continuous supply of medicines, as well as enable social control through information to analyze access, coverage and quality of care[15,16].

The data collected by the municipalities are transferred via Internet, consolidated by the Ministry of Health and made it available monthly for public access on the DATASUS website, allowing access to reports with operational, managerial and epidemiological indicators predefined by the National Coordination of the Hypertension Program and Diabetes (CNPHD). Users can also access key system database information, calculate indicators, produce charts and maps from their own fast tabs using the free Tabnet and Tabwin applications available from Datasus[15,16].

Data analysis

The prevalence of DF and DM amputation were calculated, stratified by type 1 DM, type 2 DM, and concomitant arterial hypertension, by sex and age group, by comorbidities and associated risk factors (smoking, sedentary lifestyle, overweight, acute myocardial infarction, stroke, Chronic Kidney Disease and DF) expressed as a percentage using the direct method.

Prevalence ratios (PR) were calculated and associations of PD and amputations with risk factors and comorbidities reported in the system were analyzed. The dependent variables (y) were DF and amputations, the independent variables (x) were sex, age, smoking, sedentary lifestyle, overweight, acute myocardial infarction (AMI), stroke, Chronic Kidney Disease (CKD) and DF. Associations were analyzed through Pearson's chi-square test and Yates correction, using the Stata®14.0 statistical program and considering the 95% confidence level.

Ethical and Legal Aspects

This study involved only the description and analysis of population secondary data collected from sources of information of public domain. No individually identifiable information from patients was obtained for this research.

RESULTS

Sample and characteristics

A total of 64,196 diabetics, residentes in Espirito Santo were found registered and followed by SIS-Hiperdia, out of them 2,512 (3.9 %) were type 1 DM, 6,995 (10.9%) were type 2 DM and 54,689 (85.2%) were diabetic with hypertension. The majority of them 42,780 (66.6%), were females, 29,282 (45.6%) aged 40 to 59 years and 28.999 (45.2%) aged 60 years old and above.Table 1 illustrates the total number of individuals who composed the sample andits stratification by type of DM, sex and age group.

Table 1: Total number of residents in Espiritu Santo, Brazil registered inSIS-HIPERDIA system, from 2003 to 2012, stratified by type of DM, sex and age.

Variables	Total	%	Type I DM*	%	Type II DM*	%	DM* w/ hypertension	%
Sample	64,196	100	2,512	3.9	6.995	10,9	54.689	85.2
Sex								
Male	21,416	33.4	1,138	45.3	2.875	41,1	17.403	31.8
Female	42,780	66.6	1,374	54.7	4.120	58,9	37.286	68.2
Age group								
Upto 19	696	1.1	391	15.6	99	1,4	206	0.4
20 to 39	5,219	8.1	672	26.8	995	14,2	3.552	6.5
40 to 59	29,282	45.6	922	36.7	3.767	53,9	24.593	45.0
60 and +	28,999	45.2	527	21.0	2.134	30,5	26.338	48.2

Source: SIS-HIPERDIA (DATASUS), 2019.

Prevalence of Diabetic Foot

In type 1 DM, the prevalence of DF in the analyzed sample was 2.9% (n = 74). Higher rates of DF were observed in men, aged over 60 years and when was linked to smoking; sedentary lifestyle; overweight; AMI; Stroke and CKD.

On analysing the correlation between PD and associated risk factors and comorbidities it was found a statistically significant association in all analyzed variables, except for sedentary lifestyle, overweight and stroke.

Table 2 illustrates the prevalence rates of PD in type 1 DM, stratified by sex, age, risk factors and associated comorbidities.

Table 2: Prevalence % of PD in type 1 DM population, stratified by sex, age group, smoking, sedentary lifestyle, overweight, AMI, stroke and CKD, in the state of Espírito Santo from 2003 to 2012

Variables	Yes n (P%) IC=95%	No n (P%) IC=95%	PR (IC=95%)	"p"
DF	74 (2.9) 2.3 – 3.7	2,438 (97.1) 96.3 – 97.7		
Sex				
Male	44 (3.9) 2.9 – 5.2	1,094(96.1) 94.8 – 97.1	1.77 (1.12 - 2.80)	0.0180
Female	30 (2.2) 1.5 – 3.1	1,344(97.8) 96.9 – 98.5		
Age group				
Upto 19	5 (1.3) 0.5 – 3.1	386 (98.7) 96.9 – 99.5	3.41 (1.31 - 8.90)	0.0174
20 to 39	14 (2.1) 1.2 – 3.6	658 (97.9) 96.4 – 98.8	2.09 (1.09 - 4.03)	
40 to59	32 (3.5) 2.4 – 4.9	890 (96.5) 95.1 – 97.6	1.26 (0.74 - 2.13)	
60 and +	23 (4.4) 2.8 – 6.6	504 (95.6) 93.4 – 97.2		
Risk factors and comorbidities				
Smoking				
Yes	17 (4.9) 3.0 – 7.8	332 (95.1) 92.2 – 97.0	1.85 (1.09 – 3.14)	0.0339
No	57 (2.6) 2.0 – 3.4	2,106 (97.4) 96.6 – 98.0		
Sedentary life style				
Yes	33 (3.5) 2.5 – 5.0	907 (96.5) 95.0 – 97.5	1.35 (0.86 – 2.11)	0.2410
No	41 (2.6) 1.9 – 3.6	1,531 (97.4) 96.4 – 98.1		
Overweight				
Yes	17 (3.2) 1.9 – 5.1	521 (96.8) 94.9 – 98.1	1.09 (0.64 – 1.87)	0.8514
No	57 (2.9) 2.2 – 3.8	1,917 (97.1) 96.2 – 97.8		
AMI				
Yes	7 (10.6) 4.7 – 21.2	59 (89.4) 78.8 – 95.3	3.87 (1.85 – 8.11)	0.0008
No	67 (2.7) 2.1 – 3.5	2,379 (97.3) 96.5 – 97.9		
Stroke				
Yes	4 (6.5) 2.1 – 16.5	58 (93.5) 83.5 – 97.9	2.26 (0.85 – 5.99)	0.2031
No	70 (2.9) 2.2 – 3.6	2,380 (97.1) 96.4 – 97.8		
CDK				
Yes	10 (9.0) 4.6 – 16.3	101 (91.0) 83.7 – 95.4	3.38 (1.78 – 6.40)	0.0003
No	64 (2.7) 2.1 – 3.4	2,337 (97.3) 96.6 – 97.9		

n – Number of individuals; P% - Pervent prevalence; IC – Confidence interval; PR – Prevalence Ratio; "p" – p value by the chi-square test of Pearson and the Yates correction. Source: SIS-HIPERDIA (DATASUS), 2019.

The prevalence of DF in the group of patients with type 2 DM was 3.3% (n = 228). Higher rates of DF were observed in men, aged over 60 years and whenwas related to smoking; sedentary lifestyle; AMI; Stroke and CKD.

Analysis of the correlation between DF and associated risk factors and comorbidities showed a statistically significant association in all variables, except overweight.

The prevalence rates of DF in type 2 DM, stratified by sex, age, risk factors and associated comorbidities are presented in Table 3.

Table 3: Prevalence % of DFin type 2 DM population, stratified by sex, age group, smoking, sedentary lifestyle, overweight, AMI, stroke and CKD, in the state of Espírito Santo from 2003 to 2012

Variables	Yes n (P%) IC=95%	No n (P%) IC=95%	PR (IC=95%)	"p"
DF	228 (3.3) 2.9 – 3.7	6,767 (96.7) 96.3 – 97.1		
Sex				
Male	110(3.8) 3.2 – 4.6	2,765 (96.2) 95.4 – 96.8	1.34 (1.03 – 1.72)	0.0307
Female	118(2.9) 2.4 – 3.4	4,002 (97.1) 96.6 – 97.6		
Age group				
Upto 19	4 (4.0) 1.3 – 10.6	95 (96.0) 89.4 – 98.7	1.11(0.42–2.97)	< 0.0001
20 to 39	20 (2.0) 1.3 – 3.1	975 (98.0) 96.9 – 98.7	2.24(1.39 –3.60)	
40 to 59	108 (2.9) 2.4 – 3.5	3,659 (97.1) 96.5 – 97.6	1.57(1.2–2.05)	
60 and +	96 (4.5) 3.7 – 5.5	2,038 (95.5) 94.5 – 96.3		
Risk factors and comorbidities				
Smoking				
Yes	48 (4.3) 3.2 – 5.7	1,075 (95.7) 94.3 – 96.8	1.39 (1.02 – 1.9)	0.0457
No	180 (3.1) 2.6 – 3.5	2,106 (96.9) 96.5 – 97.4		
Sedentary lifestyle				
Yes	133 (3.9) 3.3 – 4.6	907 (96.1) 95.4 – 96.7	1.48 (1.14 – 1.92)	0.0036
No	95 (2.6) 2.2 – 3.2	1,531 (97.4) 96.8 – 97.8		
Overweight				
Yes	75 (2.8) 2.2 – 3.5	2.648 (97.2) 96.5 – 97.8	0.77 (0.59 – 1.01)	0.0672
No	153 (3.6) 3.1 – 4.2	4,119 (96.4) 95.8 – 96.9		
AMI				
Yes	25 (16.1) 10.9 – 23.1	130 (83.9) 76.9 – 89.1	5.43 (3.70 – 7.98)	< 0.0001
No	203 (3.0) 2.6 – 3.4	6,637 (97.0) 96.6 – 97.4		
Stroke				
Yes	19 (12.5) 7.9 – 19.1	133 (87.5) 80.9 – 92.1	4.09 (2.63 – 6.36)	< 0.0001
No	209 (3.1) 2.7 – 3.5	6,634 (97.1) 96.5– 97.3		
CKD				
Yes	38 (13.0) 9.5 – 17.5	254 (87.0) 82.5 – 90.5	4.59 (3.31 – 6.37)	< 0.0001
No	190 (2.8) 2.5 – 3.3	6,513 (97.2) 96.7 – 97.5		

n – Number of individuals; P% - Pervent prevalence; IC – Confidence interval; RP – Prevalence Ratio; "p" – p value by the chi-square test of Pearson and the Yates correction. Source: SIS-HIPERDIA (DATASUS), 2019.

In DM with hypertension, the prevalence of DF in the sample analyzed was 4.5% (n = 2,480). Higher rates of DF were observed in men, aged up to 19 years and when was conneted to smoking; sedentary lifestyle; AMI; Stroke and CKD.

Analysis of the correlation between DF and associated risk factors and comorbidities evidenced a statistically significant association in all variables, except overweight.

Table 4 indicates the prevalence rates of DF in DM with hypertension, stratified by sex, age, risk factors and associated comorbidities.

Table 4: Prevalence % of DF in the DM population with hypertension, stratified by sex, age group, smoking, sedentary lifestyle, overweight, acute myocardial infarction, stroke and chronic kidney disease, in the state of Espírito Santo from 2003 to 2012

Variables	Yes n (P%) IC=95%	No n (P%) IC=95%	PR (IC=95%)	"p"
DF	2,480 (4.5) 4.4 – 4.7	52,209 (95.4) 95.3 – 95.6		
Sex				
Male	901(5.2) 4.9 – 5.5	16,502 (94.8) 94.5 – 95.1	1.22 (1.13 – 1.32)	< 0.0001
Female	1,579(4.2) 4.0 – 4.4	35,707 (95.8) 95.6 – 96.0		
Age group				
Upto 19	13 (6.3) 3.5 – 10.8	193 (93.7) 89.24 – 96.5		< 0.0001
20 to 39	166 (4.7) 4.0 – 5.4	3,386 (95.3) 94.6 – 96.0	1.35(0.78–2.33)	
40 to 59	1,092 (4.4) 4.2 – 4.7	23,501 (95.6) 95.3 – 95.8	1.42(0.84–2.41)	
60 and +	1,209 (4.6) 4.3 – 4.9	25,129 (95.4) 95.1 – 95.7	1.37(0.81–2.33)	
Risk factors and comorbidities				
Smoking				
Yes	670 (7.6) 7.1 – 8.2	8,156 (92.4) 91.8 – 92.9	1.92 (1.77 – 2.10)	< 0.0001
No	1,810 (3.9) 3.8 – 4.1	44,053 (96.1) 95.9 – 96.2		
Sedentary lifestyle				
Yes	1,360 (4.8) 4.6 – 5.1	26,790 (95.2) 94.9 – 95.4	1.14 (1.06 – 1.24)	0.0006
No	1,120 (4.2) 4.0 – 4.5	25,419 (95.8) 95.5 – 96.0		
Overweight				
Yes	1,224 (4.4) 4.2 – 4.6	26,612 (95.6) 95.4 – 95.8	0.94 (0.87 – 1.02)	0.1203
No	1,256 (4.7) 4.4 – 4.9	25,597 (95.3) 95.1 – 95.6		
AMI				
Yes	626 (11.5) 10.7 – 12.4	4,821 (88.5) 87.6 – 89.3	3.05 (2.80 – 3.33)	< 0.0001
No	1,854 (3.8) 3.6 – 3.9	47,388 (96.2) 96.1 – 96.4		
Sroke				
Yes	598 (11.3) 10.4 – 12.1	4,715 (88.7) 87.9 – 89.6	2.95 (2.71 – 3.22)	< 0.0001
No	1,882 (3.8) 3.6 – 4.0	47,494 (96.2) 96.0– 96.4		
CKD				
Yes	600 (12.9) 12.0 – 13.9	4,046 (87.1) 86.1 – 88.0	3.44 (3.15 – 3.75)	< 0.0001
No	1,880 (3.8) 3.6 – 3.9	48,163 (96.2) 96.1 – 96.4		

n – Number of individuals; P% - Pervent prevalence; IC – Confidence interval; RP – Prevalence Ratio; "p" – p value by the chi-square test of Pearson and the Yates correction. Source: SIS-HIPERDIA (DATASUS), 2019.

DISCUSSION

Our findings showed that, in the State of Espírito Santo, Brazil, the prevalence of DF were higher in type 2 DM n = 228 (3.3%), and even higher in DM coexistence and hypertension n = 2,480 (4.5%). These numbers converge with results of a recent systematic meta-analysis review on prevalence of DF, in which DF lesions were also more prevalent in type 2 DM patients (6.4%) than in patients with type 1 DM (5; 5%) and high prevalence of hypertension (63.4%) in the population studied[17].

German researchers also observed a higher prevalence of DF in the type 2 DM population (13.7%) compared with type 1 DM (5.1%) and correlation with hypertension in both samples, in a retrospective cohort study with a total of 899 patients with DM type 1 and 4,007 with type 2 DM[18]. A study carried out in Brazil, a much higher prevalence was estimated in the population of Recife city with 9% among individuals with type 2 DM (n = 1,374 - 95% CI)[19].

In Romania, when approaching 126 patients with type 1 DM and 142 with type 2 DM, a prevalence of peripheral neuropathy was found in 28.7% of patients with type 1 DM and 50.7% of those with type 2 DM, demonstrating a higher risk of PD syndrome in patients with type 2 DM[20].Peripheral neuropathy is an important triggering factor for foot injuries in people with DM[1].

In type 1 diabetics, the lower prevalence of DF may be justified by good glycemic control related to intensive insulin use, slowing the chain of pathophysiological events of microvascular complications, being associated with an improvement in skin microcirculation and a lower incidence of ischemic foot ulcers[21]. The higher prevalence among people with DM associated with hypertension may be justified by the fact that hypertension contributes significantly to microvascular disease in DM, responsible for the pathophysiological changes that determine DF[22].

When analyzing the literature, it is observed that the prevalence of DF in the state of Espirito Santo is below the national average, which may be correlated with low notification of cases, since the detection of this condition is directly related to the foot examination, however, this analysis was not the object of this research. In 2013, the National Health Survey showed that in the state of Espírito Santo the proportion of diabetics who never had their feet clinicallyexamined was higher (58.64%) than those who had [23].

A study conducted in Spain with 443 type 2 diabetic patients followed by primary care services showed that only 37% had their feet examined[24].In another study, South African researchers demonstrated that only 22.2% of 200 type 2 diabetics reported having their feet examined before developing foot problems[25].

Regarding the variable gender, the highest prevalence of DF was observed in males in both types of DM. In DM type 1 n = 44 (3.9%) RP = 1.77 p = 0.0180 (CI = 95%), DM type 2 n = 110 (3.8%) RP = 1.34p = 0.0307 (CI = 95 %) and DM with hypertension n = 901 (5.2%) RP = 1.22 p = <0.0001 (CI = 95%). The results converge with the EURODIALE study, which shows that males are at higher risk of developing DF as well as have a higher frequency of foot injuries[26].

A cross-sectional study of 1,515 people with type 2 DM, aged over 40 years, in southern Brazil also showed that risk of DF was more frequent among men n = 97 (17.3%) than in women n = 108 (11.3%)[27]. In Pernambuco, Brazil, a survey conducted with 1,374 people with type II DM also evidenced a higher prevalence of DF in males n = 410 (9.8%) than females n = 963 (8.6%) with PR. = 1.1319.However, a slightly higher prevalence in females (51.46%) was observed in the Brazilian population, as revealed by the National Health Survey[23].

The higher prevalence of DF in men has been associated with the fact that men tend to be more careless about their own health care, and more reluctant to seek medical attention and follow preventive recommendations[28,29].

Higher DF prevalence by age group was observed among individuals aged 60 years and older in type 1 DM n = 23 (4.4%) PR = 3.41, 2.09 and 1.26 p = 0.0174 and in type 2 DM n = 96 (4.5%) PR = 2.24, 1.57 and 1.11 p <0.001 and up to 19 years in patients with DM and hypertension n = 13 (6.3%) RP = 1.42, 1, 37 and 1,35 p <0.001. Complications and self-care deficit are known to appear with aging people living with DM. Predominantly after 40 years of age, macrovascular and microvascular complications are more frequent, and may affect the retina, renal glomerulus, and peripheral nerves, further compromising the practice of foot self-care[30].

The data are also compatible with the worldwide prevalence of mean age from 56.1 to 61.7 years[17]. Data from the National Health Survey are alike with our findings indicating in Brazil a higher prevalence of wounds or PD ulcers in the age group above 60 years[23].

Our researched population showed a higher prevalence of DF in hypertensive diabetics under the age of 19 years. This fact suggests that hypertension may be associated with the higher rate of progression of microvascular and macrovascular complications of DM in the young population with associated DM and hypertension, however this analysis was not the focus of our study. Other studies have shown an association between DF and hypertension in individuals older than 40 years[20,31,32,33].Association of hypertension with increased risk of microvascular and macrovascular complications, and increased cardiovascular risk in DM has also been demonstrated[34,22,35].

Higher DF prevalence was observed when associated with smoking, physical inactivity, AMI, stroke and CKD in type 1 DM, type 2 DM and hypertensive DM. In overweight individuals, the prevalence of DF was higher only in type 1 DM.

Analysis of the correlation between PD and associated risk factors and comorbidities showed a statistically significant association in all variables except overweight, sedentary lifestyle and stroke in type 1 DM, and overweight in type 2 DM and in DM with hypertension.

Diabetes Care in General Practice study demonstrated an association of smoking, physical inactivity, AMI and stroke with a higher occurrence of DF both at the time of diagnosis as well as six years after[36]. In Germany, a higher prevalence of DF was associated with smoking, CKD and hypertension in both type 1 and type 2 diabetics18.

In southern Brazil, a higher risk for DF was observed in patients with a history of AMI n = 17 (18.1%) and stroke n = 12 (12.8%). They also presented higher risk of hypertension n = 62 (66%) and smoking n = 12 (12.8%), however without significant statistical correlation[37].

In Canada, an analysis of 2,040 adults with type 2 DM showed a prevalence of DF in 5.58% of the sample, and predictors of DF injuries were smoking, heart disease, and stroke (<0.001) in both neuropathy and in vasculopathy[38].

Tobacco is related to the development of type 2 DM as a triggering or aggravating factor due to its effects on cortisol concentrations, inflammatory markers, oxidative stress, insulin resistance and an increase in fasting glucose, thus favoring vascular and neuropathic complications[39,40].

Sedentary lifestyle and smoking were associated with higher cardiovascular risk[41]. Several studies relate sedentary lifestyle to increased insulin resistance, favoring increased glycemic rates with pathophysiological repercussions on diabetic neuropathy and on micro and macrovascular changes[42].

Patients with mild to moderate CKD are at higher risk for DF and amputations[43]. Higher morbidity and mortality related to coronary and cerebrovascular diseases were also associated, which justifies the findings of this research[44].

The pathophysiological mechanism of peripheral neuropathy is directly related to hyperglycemia caused by poor control of DM, which leads to a disturbance in the peripheral nervous system through the activation of metabolic, biochemical and inflammatory pathways, mediated by the immune system, damaging the nerve fibers[45,46].

This same process is also related to neuropathic dysfunctions that directly affect the autonomic nerves. It is

important to recognize the presence of diabetic autonomic neuropathy in patients because of its impact not only on morbidity but also on mortality. Specifically, the presence of cardiac autonomic neuropathy is associated with an increased risk of mortality. These may be related to cardiac arrhythmias, silent ischemia, and increased risk of AMI[47].

Given the factors that directly affect the development of DF, we realize the need that individuals with diabetes should have to maintain self-care and also the importance of the multidisciplinary team to ensure quality of life of these patients, advising on the disease and its risks[48].

Another research demonstrated the importance of a new look at the work processes, aiming at the individual's health instead of just looking at the disease[49]. In addition, it is essential to carry out educational methods with patients to improve health promotion and education practices, these practices are fundamental for the delivery of services and assistance to individuals with chronic diseases, ensuring the change in the care model[50,51].

The results show a significant prevalence of DF in the state of Espírito Santo, requiring constant monitoring and periodic review of strategies for the implementation of public policies for coping with the disease.

It is noticed that the diabetic population is in permanent threat to have complications associated to the disease and that the adoption of effective public policies are essential to control the risk factors related to the pathophysiological development of DF and eventual amputation.

Ensuring comprehensive care, self-care education, androutine feet examination of diabetic people, especially at the primary level of health care, by family health teams can promote the reduction of DF prevalence and consequently improve the quality of life of people with DM.

As a limitation of this study, we highlight the low notification of DF in the researched database, however, this can be a warning to the public power on the need to implement health policies capable of encouraging the routine assessment of diabetic feet by health professionals.

CONCLUSION

Important prevalence rates of DF in Espitiro Santo State was observed, especially, in men of 60 years and older.

Higher prevalences were observed in individuals with smoking, physical inactivity, AMI, stroke and CKD in type 1 DM, type 2 DM and DM with hypertension. In overweight individuals, the prevalence of DF was higher only in type 1 DM.

Analysis of the correlation between DF and associated risk factors and comorbidities showed a statistically significant association in all studied variables, except overweight in type 1 DM, type 2 DM and DM with hypertension, and sedentary lifestyle and stroke in type 1 DM.

Author Contributions

All authors contributed to the manuscript. Wendel Jose Teixeira Costa: Participated in data collection, data analysis, statistical analysis and writing of the text. Luiz Carlos de Abreu: Participated in the study design, statistical analysis, discussion of results and final version of the text. Thaiany Pedrozo Campos Antunes: Participated in the discussion of results, writing and final version of the text and reviews. José Lucas Souza: Participated in the study design, data collection phase and revision of the text. Nilson Penha-Silva: Participated in the study design, data collection phase and revision of the text. Jonathan Mendes de Castro: Participated in the general orientation of the research, definition of the study design and final revision of the text. João Batista Francalino da Rocha: Participated in the general orientation of the research, definition of the study design and final revision of the text. Italla Maria Pinheiro Bezerra: Participated in the general orientation of the research, definition of the study design, statistical analysis, discussion of results and final version of the text.

Funding

This study was supported by the Fundação de Amparo a Pesquisa do Espirito Santo (FAPES) 3/2017 - UNIVERSAL

Acknowledgments

Fundação de Amparo a Pesquisa do Espirito Santo (FAPES)

Conflicts of Interest: The authors report no conflict of interest.

REFERENCES

1. International Diabetes Federation. Diabetes Atlas. 8th ed. Brussels. https://diabetesatlas.org/resources/2017-atlas.html (2017). Acessed on Mar 2nd 2019.
2. WHO. World Health Organization. Global Report on Diabetes. http://www.who.int/mediacentre/factsheets/fs312/en/ (2016). Acessed on Aug 16th 2018.
3. López-Jaramillo P, Sánchez RA, Diaz M, Cobos L, Parra-Carrillo BAJZ, Lizcano F, Lanas F, Sinay I, Sierra ID, Peñaherrera E, Bendersky M, Schmid H, Botero R, Urina M, Lara J, Foss MC, Márquez G, Harrap S, Ramírez AJ, Zanchetti A. Consenso latino-americano de hipertensão em pacientes com diabetes tipo 2 e síndrome metabólica. Arq Bras Endocrinol Metab. 2014; doi: http://dx.doi.org/10.1590/0004-2730000003019.
4. BRASIL. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes 2017-2018. https://www.diabetes.org.br/profissionais/images/2017/diretrizes/diretrizes-sbd-2017-2018 (2018). Accessed on Mar 2nd 2019.

5. Santos MAS, Oliveira MM, Andrade SSCA, Nunes ML, Malta DC, Moura L. Tendências da morbidade hospitalar por doenças crônicas não transmissíveis no Brasil, 2002 a 2012. Epidemiol. Serv. Saúde. 2015; doi: 10.5123/S1679-49742015000300005.
6. Apelqvist J, Bakker K, Houtum WH, Nabuurs-Franssen MH, Schaper NC. International Consensus and Practical Guidelines on the Management and the Prevention of the Diabetic Foot. Diabetes Metab Res Rev. 2000; doi: https://doi.org/10.1002/1520-7560(200009/10)16:1.
7. Ocampo-Barrio P, Landeros-González D, Rojas LRM. Frecuencia de depresión en pacientes con y sin pie diabético. Semergen. 2010; doi: https://doi.org/10.1016/j.semerg.2010.04.010.
8. Prompers L, Schaper N, Apelqvist J, Edmonds M, Jude E, Mauricio D, Uccioli L, Urbancic V, Bakker K, Holstein P, Jirkovska A, Piaggesi A, Ragnarson-Tennvall G, Reike H, Spraul M, Acker KV, Baal JV, Merode FV, Ferreira I, Huijberts M. Prediction of outcome in individuals with diabetic foot ulcers: focus on the differences between individuals with and without peripheral arterial disease. Diabetologia. 2008; doi: 10.1007/s00125-008-0940-0.
9. Tavares DMS, Dias FA, Araújo LR, Pereira GA Perfil de clientes submetidos a amputações relacionadas ao diabetes mellitus erfil de clientes submetidos a amputações relacionadas ao diabetes mellitus. Rev Bras Enferm. 2009; doi: http://dx.doi.org/10.1590/S0034-71672009000600004.
10. Boulton AJ, Vileikyte L, Ragnarson-Tennvall G, Apelqvist J. The Global Burden of Diabetic Foot Disease. Lancet. 2005; doi: 10.1016/S0140-6736(05)67698-2.
11. Battum PV, Schaper N, Prompers L, Apelqvist J, Jude E, Piaggesi A, Bakker K, Edmonds M, Holstein P, Jirkovska A, Mauricio D, Tennvall GR, Reike H, Spraul M, Uccioli L, Urbancic V, Acker KV, Baal JV, Ferreira I, Huijberts M. Differences in minor amputation rate in diabetic foot disease throughout Europe are in part explained by differences in disease severity at presentation. Diabet Med. 2011; doi: 10.1111/j.1464-5491.2010.03192.x.
12. Oliveira SLC, filho WDL. AIDS e Diabetes Mellitus Versus Justiça Distributiva no Sistema Público de Saúde. Rev Bras Enferm. 2004; doi: org/10.1590/S0034-71672004000600025.
13. BRASIL. Ministério da Saúde. Portaria nº 2.436. http://bvsms.saude.gov.br/bvs/saudelegis/gm/2017/prt2436_22_09_2017.html (2017). Acessado em 2 de mar 2019.
14. Zangirolami-Raimundo J, Echeimberg JO, Leone C. Researchmethodologytopics: Cross sectional studies. Journal of Human Growth and Development. 2018; doi: http://dx.doi.org/10.7322/jhgd.152198.
15. BRASIL. Ministério da Saúde. Portaria Nº 371. http://bvsms.saude.gov.br/bvs/saudelegis/gm/2002/prt0371_04_03_2002_rep.html (2002). Acessado em 2 de mar 2019.
16. BRASIL. Ministério da Saúde. Portaria Nº 235. http://bvsms.saude.gov.br/bvs/saudelegis/gm/2001/prt0235_20_02_2001.html (2001). Acessado em 2 de mar 2019.
17. Zhang P, Lu J, Jing Y, Tang S, Zhu D, Bi Y. Global epidemiology of diabetic foot ulceration: a systematic review and meta-analysis. Annals Of Medicine. 2017; doi: 10.1080/07853890.2016.1231932.
18. Wolf G, Müller N, Busch M, Eidner G, Kloos C, Hunger-Battefeld W, Müller UA. Diabetic foot syndrome and renal function in type 1 and 2 diabetes mellitus show close association. Nephrol Dial Transplant. 2009; doi: 10.1093/ndt/gfn724.
19. Vieira-Santos ICR, Souza WV, Carvalho EF, Medeiros MCWC, Nóbrega MGL, Lima PMS. Prevalência de pé diabético e fatores associados nas unidades de saúde da família da cidade do Recife, Pernambuco, Brasil, em 2005. Cad. Saúde Pública. 2008; doi: http://dx.doi.org/10.1590/S0102-311X2008001200015.
20. Bondar AC, popa AR. Diabetic Neuropathy Prevalence and Its Associated Risk Factors in Two Representative Groups of Type 1 and Type 2 Diabetes Mellitus Patients from Bihor County. Maedica (Buchar). 2018; doi: 10.26574/maedica.2018.13.3.229.
21. Rathsman B, Jensen-Urstad K, Nyström T. Intensified insulin treatment is associated with improvement in skin microcirculation and ischaemic foot ulcer in patients with type 1 diabetes mellitus: a long-term follow-up study. Diabetologia. 2014; doi: 10.1007/s00125-014-3248-2.
22. Adler AI, Stratton IM, Neil HA, Yudkin JS, Matthews DR, Cull CA, Wright AD, Turner RC, Holman RR. Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): prospective observational study. BMJ. 2000; doi: 10.1136/bmj.321.7258.412.
23. BRASIL. IBGE – INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATISTICA. Pesquisa Nacional de Saúde 2013: percepção do estado de saúde, estilos de vida e doenças crônicas. Rio de Janeiro: IBGE, 2014.
24. Alonso-Fernándeza M, Mediavilla-Bravob JJ, López-Simarroc F, Comas-Samperd JM, Carramiñana-Barrerae F, Mancera-Romerof J, Nocitog AS. Evaluation of diabetic foot screening in Primary Care. Endocrinol Nutr. 2014; doi: 10.1016/j.endoen.2014.06.008.

25. Goie TT, Naidoo M. Awareness of diabetic foot disease amongst patients with type 2 diabetes mellitus attending the chronic outpatients department at a regional hospital in Durban, South Africa. Afr J Prim Health Care Fam Med. 2016; doi: 10.4102/phcfm.v8i1.1170.
26. Prompers L, Huijberts M, Apelqvist J, Jude E, Piaggesi A, Bakker K, Edmonds M, Holstein P, Jirkovska A, Mauricio D, Tennvall GR, Reike H, Spraul M, Uccioli L, Urbancic V, Van Acker K, Van Baal J, Van Merode F, Schaper N. Delivery of care to diabetic patients with foot ulcers in daily practice: results of the Eurodiale Study, a prospective cohort study. Diabet Med. 2008; doi: 10.1111/j.1464-5491.2008.02445.x.
27. Rossaneis MA, Haddad MD, Mantovani MF, Marcon SS, Pissinati PS. Foot ulceration in patients with diabetes: a risk analysis. Br J Nurs. 2017; doi: 10.12968/bjon.2017.26.6.S6.
28. Monteiro-Soares H, Boyko EJ, Ribeiro J, Ribeiro I, Dinis-Ribeiro M. Predictive factors for diabetic foot ulceration: a systematic review. Diabetes Metab Res Ver. 2012; doi: 10.1002/dmrr.2319.
29. Tang ZQ, Chen HL, Zhao FF. As diferenças de género de menor risco de amputação de membros em pacientes com pé diabético: a meta-análise. Int J Feridas Baixa Extrem. 2014; doi: https: //dx.doi. org / 10,1177 / 1534734614545872.
30. Shahbazian H, Yazdanpanah L, Latifi SM. Risk assessment of patients with diabetes for foot ulcers according to risk classification consensus of international working group on diabetic foot. Pak J Med Sci. 2013; doi: http://dx.doi.org/10.12669/pjms.293.3473.
31. Sarfo-Kantanka O, Sarfo FS, Kyei I, Agyemang C, Mbanya JC. Incidence and determinants of diabetes-related lower limb amputations in Ghana, 2010-2015- a retrospective cohort study. BMC Endocr Disord. 2019; doi: 10.1186/s12902-019-0353-8.
32. Namayandeh SM, Karimi A, Fallahzadeh H, Rahmanian M, SadrBafghi SM, Soltani M, Hadiani L. The incidence rate of diabetes mellitus (type II) and its related risk factors: A 10-year longitudinal study of Yazd Healthy Heart Cohort (YHHC), Iran. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2019; https://doi.org/10.1016/j.dsx.2019.02.012.
33. 3Darivemula S, Nagoor K, Patan SK, Reddy NB, Deepthi CS, Chittooru CS. Prevalence and Its Associated Determinants of Diabetic Peripheral Neuropathy (DPN) in Individuals Having Type-2 Diabetes Mellitus in Rural South India. Indian J Community Med. 2019; doi: 10.4103/ijcm.IJCM_207_18.
34. O'Hare JA, Abuaisha F, Geoghegan M. Prevalence and forms of neuropathic morbidity in 800 diabetics. Ir J Med Sci. 1994; 163:132–5. PMID: 8200777.
35. Reindel J, Zander E, Heinke P, Kohnert KD, Allwardt C, Kerner W. (2004). Metabolisches Syndrom bei Patienten mit Diabetes mellitus Typ 1. Herz. 2004; doi:10.1007/s00059-004-2606-0.
36. Bruun C, Siersma V, Guassora AD, Holstein P, de Fine Olivarius N. Amputations and foot ulcers in patients newly diagnosed with type 2 diabetes mellitus and observed for 19 years. The role of age, gender and co-morbidity. Diabet Med. 2013; doi: 10.1111/dme.12196.
37. Bortoletto MS, Andrade SM, Matsuo T, Haddad MCL, González AD, Silva AMR. Risk factors for foot ulcers--a cross sectional survey from a primary care setting in Brazil. Prim Care Diabetes. 2014; doi:
38. Sayah F, Soprovich A, Qiu W, Edwards AL, Johnson JA. Diabetic Foot Disease, Self-Care and Clinical Monitoring in Adults with Type 2 Diabetes: The Alberta's Caring for Diabetes (ABCD) Cohort Study. Can J Diabetes. 2015; doi: 10.1016/j.jcjd.2015.05.006.
39. Nakanishi N, Nakamura K, Matsuo Y, Suzuki K, Tatara K. Cigarette smoking and risk for impaired fasting glucose and type 2 diabetes in middle-aged Japanese men. Ann Intern Med. 2000; doi: 10.7326/0003-4819-133-3-200008010-00009.
40. Clair C, Rigotti NA, Meigs JB. Smoking cessation, weight change, and risk of cardiovascular disease--reply. JAMA. 2013; doi: 10.1001/jama.2013.7945.
41. Jang JJ, Bhapkar M, Coles A, Vemulapalli S, Fordyce CB, Lee KL, Udelson JE, Hoffmann U, Tardif JC, Jones WS, Mark DB, Sorrell VL, Espinoza A, Douglas PS, Patel MR. Predictive Model for High-Risk Coronary Artery Disease. Circulation: Cardiovascular Imaging. 2019; doi: https://doi.org/10.1161/CIRCIMAGING.118.007940.
42. Mutie PM, Giordano GN, Franks PW. Lifestyle precision medicine: the next generation in type 2 diabetes prevention?. BMC Med. 2017; doi: 10.1186/s12916-017-0938-x.
43. Matsushita K, Ballew SH, Coresh J, Arima H, Ärnlöv J, Cirillo M, Ebert N, Hiramoto JS, Kimm H, Shlipak MG, Visseren FLJ, Gansevoort RT, Kovesdy CP, Shalev V, Woodward M, Kronenberg F. Measures of chronic kidney disease and risk of incident peripheral artery disease: a collaborative meta-analysis of individual participant data. Lancet Diabetes Endocrinol. 2017; doi: 10.1016/S2213-8587(17)30183-3.
44. Criqui MH, Aboyans V. Epidemiology of Peripheral Artery Disease. Circ. Res. 2015; doi: 10.1161/CIRCRESAHA.116.303849.

45. Tesfaye S, Boulton AJ, Dyck PJ, Freeman R, Horowitz M, Kempler P, Lauria G, Malik RA, Spallone V, Vinik A, Bernardi L, Valensi P. Diabetic neuropathies: update on definitions, diagnostic criteria, estimation of severity, and treatments. Diabetes Care. 2010; doi: 10.2337/dc10-1303.
46. Callaghan BC. Little AA, Feldman EL, Hughes RA. Enhanced Glucose Control for Preventing and Treating Diabetic Neuropathy. Cochrane Database Syst Rev. 2012; doi: 10.1002/14651858.CD007543.pub2.
47. Russell JW, Zilliox LA. Diabetic neuropathies. Continuum (Minneap Minn). 2014; doi: 10.1212/01.CON.0000455884.29545.d2.
48. Pires MR, Bani RCF, Lima GZ, Haddad MIR, Takamoto PM, Pires LAR, Manganaro MM, Croscioli MRFB, Fernani DCGL, Vanderlei LCM, Freire APCF, Pacagnelli FL. Problems with adherence to treatment among adolecents with diabetes mellitus type 1. J Hum Growth Dev. 2016; doi: http://dx.doi.org/10.7322/jhgd.110023.
49. Bezerra IMP, Machado MFAS, Souza OF, Antão JYFL, Dantas MNL, Reis AOA, Martins AAA, Abreu LC. Professional activity in the context of health education:a systematic review. Journal of Human Growth and Development. 2014; doi: dx.doi.org/10.7322/jhdg.88909.
50. Atrash HK, Carpentier R. The evolving role of public healthin the delivery of health care. Journal of Human Growth and Development. 2012; doi: https://doi.org/10.7322/jhgd.46349.
51. Bezerra IMP, Sorpreso ICE. Concepts and movements in health promotion to guide educational practices. J Hum Growth Dev 2016. Doi: http://dx.doi.org/10.7322/jhgd.113709.

Resumo

Introdução: O Pé Diabético (PD) é a principal causa de amputações não traumáticas nos países ocidentais, causando morte ou incapacidade física e mental, má qualidade de vida e alto custo para a sociedade.

Objetivo: Analisar a prevalência de DF e fatores de risco relacionados na população diabética residente no Estado do Espírito Santo, Brasil.

Métodos: Estudo transversal, descritivo, com delineamento de série temporal, utilizando dados secundários de morbidade de indivíduos com DF residentes no Estado do Espírito Santo, cadastrados e acompanhados pelo Sistema de Cadastro e Acompanhamento de Hipertensos e Diabéticos.

Resultados: Dos 64.196 diabéticos, 3,9% tinham DM tipo 1, 10,9% DM tipo 2 e 85,2% eram hipertensos. A prevalência de DF foi de 2,9% no DM tipo 1, 3,3% no DM tipo 2 e 4,5% no DM com hipertensão. Maiores taxas de DF foram observadas no sexo masculino, com idade acima de 60 anos no DM tipo 1 e tipo 2, e até 19 anos no DM com hipertensão, tabagismo, sedentarismo, Infarto Agudo do Miocárdio (IAM), AVC e Doença Renal Crônica (DRC)). Nos indivíduos com excesso de peso, a prevalência de DF foi maior apenas no DM tipo 1. Houve associação significativa em todas as variáveis exceto sobrepeso em ambos os tipos de DM, sedentarismo e acidente vascular cerebral no DM tipo 1.

Conclusão: Os achados mostraram importantes prevalências de DF, com maior concentração em homens com mais de 60 anos, sobre tabagismo, sedentarismo, IAM, AVC e DRC, com associação estatística significativa nas variáveis analisadas, com exceção do excesso de peso em ambos os tipos de DM, como bem como sedentarismo e acidente vascular cerebral no DM tipo 1.

Palavras-chave: Diabetes Mellitus. Pé diabético. Prevalência Epidemiologia.