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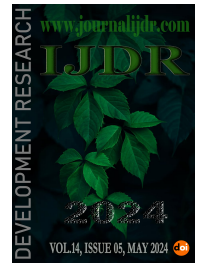
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## PREVALENCE OF DIABETIC FOOT IN A GROUP OF ELDERLY USERS OF PRIMARY HEALTH CARE

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### ABSTRACT

**Objective:** The objective of this study was to determine the prevalence of diabetic foot among users diagnosed with type I or II diabetes mellitus, attended by the Basic Health Unit Jardim Clipper, in the year 2022. **Method:** Epidemiological, descriptive, and cross-sectional study. All data were obtained from the medical records of patients attended by the Basic Health Unit Jardim Clipper, in the year 2022, located in the municipality of São Paulo, SP, Brazil. The sample consisted of 139 people diagnosed with type I and II diabetes mellitus. Inclusion criteria were all evaluations of diabetic foot in people attended by the unit, and exclusion criteria were evaluations with incomplete data. **Result:** Through the neuropathic symptoms score, it was possible to observe that 87 (62.59%) people had some neuropathic impairment, with 43 (30.94%) showing absence of vibratory sensitivity and 18 (12.95%) showing absence of the posterior tibial pulse. Thus, the combination of scores allowed diagnosing that 71 (52.25%) of the people had a prevalence of diabetic foot. Of the 139 people surveyed, 58.27% are female (n=81) and 41.73% are male (n=58); the average age found was 65.5 with a standard deviation of 10.5, with a minimum age of 23 years and a maximum of 92 years. 95% of the research subjects were diagnosed with type II diabetes, and 65% of the research subjects did not receive any type of foot care guidance. **Conclusion:** Diabetic foot was more prevalent in females, aged over 60 years, with type II diabetes. The results presented in this research, although with some methodological limitations, point to the need to readjust actions and control measures for people followed in primary care, especially in health promotion and prevention of diabetes complications.

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## INTRODUCTION

Diabetes mellitus (DM) is a chronic non-communicable disease (NCD) related to multiple causes, characterized by a gradual onset, with a usually uncertain prognosis, with a long or indefinite duration. It presents a clinical course that changes over time, with possible periods of exacerbation, which can lead to disability. It requires interventions using light, light-hard and hard technologies, associated with lifestyle changes, in a continuous care process that does not always lead to a cure. Mortality presents a strong burden of related morbidities, which are responsible for a large number of hospitalizations, as well as being among the main causes of amputations and loss of mobility and other neurological functions. They also involve a significant loss of quality of life, which deepens as the disease worsens (BRASIL, 2013).

**Diabetes Mellitus:** The term "diabetes mellitus" (DM) refers to a metabolic disorder of heterogeneous etiologies, characterized by hyperglycemia and disturbances in the metabolism of carbohydrates, proteins and fats, resulting from defects in insulin secretion and/or action. DM has increased in importance due to its increasing prevalence and is usually associated with dyslipidemia, high blood pressure and endothelial dysfunction. It is a health problem considered a sensitive condition for primary care, that is, evidence shows that good management of this problem even in primary care prevents hospitalizations and deaths from cardiovascular and cerebrovascular complications (BRASIL, 2013a). It is estimated that Brazil will pass 8th. position, with a prevalence of 4.6%, in 2000, to 6th. position, 11.3%, in 2030. Risk factors related to the population's eating habits and lifestyle are associated with this increase in the global DM burden. <sup>2</sup> In 2016 China, India and the United States were the countries with the highest index (FERNANDES *et al.*, 2016). There are several factors related to this pathology, but the increase in

the prevalence of DM is associated with rapid urbanization, epidemiological transition, nutritional transition, greater frequency of a sedentary lifestyle, greater frequency of excess weight, population growth and aging, and even the greater survival of people with chronic diseases, despite scarce resources and the high demand for care and health services (FERNANDES *et al.*, 2016). According to the World Health Organization (WHO), in 2016, high blood glucose corresponded to the third largest cause of premature death, behind only increased blood pressure and tobacco use (FERNANDES *et al.*, 2016). Primary prevention measures are necessary, which seek to protect the individual to prevent the development of the disease throughout life. Regarding the prevention of type 1 DM, the effectiveness of encouraging breastfeeding in the first three months of life has been studied (BRASIL, 2008). Worldwide, in 2010, spending on DM was estimated at 11.6% of total resources for health care. A study carried out by the WHO in 2013 showed that government costs for DM care range from 2.5% to 15% of annual health budgets, and lost production costs can exceed this budget by up to five times. Brazilian data suggest similar values, which leads to high costs for the Unified Health System (SUS) (BRASIL, 2013a).

**Diabetic Foot:** Diabetic foot is the presence of infection, ulceration and/or destruction of deep tissues associated with neurological abnormalities and varying degrees of peripheral vascular disease in the foot of people with DM (BRASIL, 2016). Distal symmetric polyneuropathy: is the most common form of diabetic peripheral neuropathy and has three stages: initial, symptomatic and severe. The initial stage is generally asymptomatic, but there may be decreased sensitivity. The symptomatic period is characterized by loss of sensitivity, numbness and, often, paresthesias and/or pain. The severe stage presents motor involvement with functional limitation and the potential for ulceration in the lower limbs (BRASIL, 2016). Diabetic foot is among the most frequent complications of DM and its consequences can be highly disabling consequences for the individual's life, starting with chronic wounds and infections and progressing to lower limb amputations. Periodic examination of the feet provides early identification and timely treatment of the changes found, thus enabling the prevention of a significant number of foot complications in people diagnosed with DM (BRASIL, 2016).

### Objectives

**General:** To identify the prevalence of diabetic foot in elderly users diagnosed with type I or II DM, attended by the Jardim Cliper Basic Health Unit, in the year 2022.

**Specific:** Compare the prevalence of diabetic foot with the sociodemographic data of the subjects studied.

## METHODOLOGY

**Study design and ethical aspects:** This is an epidemiological, descriptive, cross-sectional and documentary study. The project was submitted to the Research and Teaching Ethics Committee of the Municipal Health Department of the Municipality of São Paulo (Annex A) and to the Ethics and Research Committee of the Santo Amato University (Annex B). Having been approved by the respective Ethics Committees, authorization was obtained to access the information from the diabetic foot assessment forms (Annex C), of elderly users diagnosed with DM, from UBS Jardim Cliper.

**Study location, sampling and participants:** Research carried out at UBS Jardim Cliper, located in the south zone, in the city of São Paulo, SP, based on the collection of data from diabetic foot assessment forms, from users monitored in the Hiperdia group and diagnosed with DM, completed during the period from month to month, 2022.

### Inclusion and exclusion criteria

**Inclusion criteria:** Diabetic foot assessment records of people attended by the Jardim Cliper UBS with a medical diagnosis of DM and aged 60 years or over.

**Exclusion criteria:** Diabetic foot assessment forms that showed incomplete data.

**Sample:** Of the one hundred and forty (140) diabetic foot assessment forms, only one was excluded. Therefore, the sample for this study is made up of one hundred and thirty-nine (139) diabetic foot assessment forms, from users diagnosed with DM, monitored in the Hiperdia group, at UBS Jardim Cliper.

**Data analysis:** As a result variable, the prevalence of obesity presented by UBS Jardim Cliper users diagnosed with DM was considered. In the analytical approach, data was initially organized into Excel spreadsheets and statistical analysis was carried out using stata 14 software. Afterwards, prevalence estimates were made and prevalence ratios were calculated for obesity with a 95% confidence interval. For the descriptive analysis of qualitative variables, absolute (n) and relative frequencies (%) were calculated. For the quantitative variables, the following were calculated: means, deviations, minimum and maximum values.

**Search variables:** The following variables were selected for the operationalization and dichotomization of the dependent and independent variables of diabetic foot assessments: (1) Dependent variable: diabetic foot. (2) Independent variables: demographic data; type of diabetes; type of treatment; Neuropathic Symptom Score.

## RESULTS

In table 1, initially, we identified in the 139 records that the subjects evaluated were 58.27% female (n=81); 41.73% male (n=58); 56.12% of the sujeitos are married (n=78); the calculation of the average age was 65.5 years.

**Table 1. Descriptive analysis (number and %) of qualitative variables (nominal and ordinal)**

Sex		
Feminine	81	58.27%
Masculine	58	41.73%
Marital Status		
Single	26	18.71%
Married	78	56.12%
Widower	32	23.02%
Separated	3	2.16%

Source: Data collection from Diabetic Foot Assessment, Basic Health Unit, Jardim Cliper SP, year 2022.

In Table 2 we observe that the records of the forms inform that regarding the type of treatment for DM, 17.27% (n=24) of the subjects evaluated do not use insulin; 49.64% (n=69) use NPH; 15.10% (n=21) use NPH and Regular and; 17.99% (n=25) use Regular.

**Table 2. Types of Treatments**

Insulins		
Does not use insulin	24	17.27%
NPH	69	49.64%
NPH/Regular	21	15.10%
Regular	25	17.99%
ADOS		
Does not perform	64	46.04%
Perform	75	53.96%
Food (DIET)		
Does not perform	99	71.22%
Perform	40	28.78%
Physical activity		
Not practical	101	72.66%
Practice	38	27.34%

Source: Data collection from Diabetic Foot Assessment, Basic Health Unit, Jardim Cliper SP, year 2022. NOTE: Data express in frequency absolute (n) It isrelative(%).

Regarding oral antidiabetics (ADOs), 46.04% (n=64) do not use them and; 53.96% (n=75) use it. Regarding going on some type of diet and/or practicing physical activity: 71.22% (n=99) do not diet and 28.78% (n=40) do; 72.66% (n=101) do not practice physical activity and 27.34% (n=38) do. In table 3, the analysis of the diabetes type variables showed the following results: 5.00% (n=7) type I; 95.00% (n=132) type II.

**Table 3. Type of Diabetes and Guidelines**

Type of Diabetes		
Type I	7	5.00%
Type II	132	95.00%
Foot care guidance		
It received	48	34.53%
Did not receive	91	65.47%

Source: Data collection from Diabetic Foot Assessment, Basic Health Unit, Jardim Cliper SP, year 2022.

Using the Neuropathic Symptoms Score, it was possible to verify that 87 (62.59%) people had some neuropathic impairment; 43 (30.94%) presented an absence of vibratory sensitivity and 18 (12.95%) presented an absence of the posterior tibial pulse, the data regarding diabetic neuropathy are described at frame 4.

**Table 4. Assessment score for Signs and Symptoms resulting from Neuropathy**

Neuropathic Symptom Score		
Absence of neurological impairment	52	37.41%
Light	19	13.67%
Moderate	34	24.46%
Serious	34	24.46%
Vibratory Sensitivity (128hz tuning fork)		
Present Sensitivity;	96	69.06%
Absent sensitivity.	43	30.94%
Tactile Sensitivity (10g monofilament)		
Present Sensitivity;	66	47.48%
Absent sensitivity.	73	52.52%
Posterior Tibial Pulse		
Gift	121	87.05%
Absent	18	12.95%
Pediosus Pulse		
Gift	122	87.77%
Absent	17	12.23%

Source: Data collection from Diabetic Foot Assessment, Basic Health Unit, Jardim Cliper SP, year 2022. NOTE: Data express in frequency absolute (n) It is relative (%). ECN: Scorein Commitment Neuropathic. ESN: Scorein Symptoms Neuropathic.

## DISCUSSION

Studies that observe the predominance of females describe that this fact may be mainly related to women's greater concern for health care, as well as men's low attendance at primary health care services, which has repercussions (1) in the development of chronic complications of diseases among men, especially disabling sequelae caused by type 2 diabetes mellitus (DM2); (2) the overload of demand for care in secondary and tertiary care and; (3) increasing costs to public coffers and the health system (BATISTA *et al.*, 2020; LIRA GARCIA *et al.*, 2018; GRILLO; GORINI, 2007). In the Brazilian Southeast, research carried out in 2005 and 2018 with the aim of identifying Metabolic Syndrome in people with diabetes living in urban and rural areas of the city of Coimbra, Minas Gerais, revealed that women are three times more prone to the syndrome than men. ; since women showed greater changes in waist circumference (a conditioning factor for DM), either due to their own physiology and localized fat deposition, or due to inadequate eating habits and sedentary lifestyle ( LIRA GARCIA *et al.* , 2018; BRASILEIRO *et al.*, 2005). Researchers in 2016 and 2019 characterized their samples and demonstrated a predominance of female people, over the age of 60, who attended elementary school and had been diagnosed with DM for more than 10 years. These studies identified these factors as risk

factors for the development of diabetic foot (NEVES; ARAÚJO, 2019; DOURADO; SANTOS, 2016). In a dual-role social context, women take care of the family, work outside the home to help with daily expenses, and also access health facilities more than men. Epidemiologists explain that the greater demand for women occurs because they are more concerned about their health. This fact reaffirms the need to reflect on men's health due to their low adherence to health maintenance practices in the area covered by the Family Health Strategy (ESF), which makes them more vulnerable to complications from NCDs, such as DM2 and consequently the loss of its global functionality due to sequelae ( KOLCHRAIBER *et al.*, 2018; NILSON *et al.*, 2018). The present study presented 95% of the research subjects with a diagnosis of DM2 and of these, a further 65% did not receive any type of guidance on foot care. Researchers on the subject have found that environmental factors and lifestyle are determining factors for the high percentage of DM2 diagnoses, and not receiving guidance on self-care prematurely worsens the health conditions of these people. Thus, the aging of the population, the growing prevalence of obesity and sedentary lifestyle and urbanization processes are considered the main factors related to the increase in the incidence and prevalence of DM2 throughout the world. This scenario has generated a high social and financial cost for individuals and the health system, since DM2 is also associated with complications such as kidney failure, lower limb amputation, blindness, cardiovascular disease, among others (MALTA *et al.*, 2019; COSTA *et al.*, 2017). The changes brought about by the industrial era and currently the digital era have led people to have access to material goods and machines that provide them with greater ease and speed in carrying out daily activities, resulting in a reduction in the practice of physical activity in people. general population. A sedentary lifestyle and industrialized diet have stood out as important causes for the emergence of the main chronic diseases, especially DM2 (KOLCHRAIBER *et al.*, 2018).

The prevalence of people with diabetes worldwide has more than doubled in the last 20 years, maintaining different epidemic levels. One of the most worrying characteristics of this rapid increase is the appearance of DM2 in children, adolescents and young adults. In Brazil, the most economically developed regions have a higher prevalence of diabetes mellitus and there are several environmental factors related to this increase, including a sedentary lifestyle and obesity (KOLCHRAIBER *et al.*, 2018). Mainly in large urban centers, such as the city of São Paulo, where this study was carried out. Care for users of the public health service involves examining the feet at each routine appointment, using effective techniques for recognizing loss of sensitivity and early detection of injuries (DOURADO; SANTOS, 2016). Furthermore, these people need to be instructed in self-examination of their feet, paying special attention to the development of calluses, loss of skin integrity and the presence of pressure ulcers related to blisters or infections. The education of people with DM2 and their family members is essential in preventing these complications (DOURADO; SANTOS, 2016). The Ministry of Health has assigned strategies to nurses with the aim of preventing NCDs and reducing possible complications resulting from DM. It is up to them to develop educational activities with those diagnosed with DM; carry out nursing consultations with people at highest risk for DM2 and contribute to the tracking of possible undiagnosed patients; address risk factors , stratifying cardiovascular risk; guide lifestyle changes and non-drug treatment; check adherence and possible complications to treatment; establish, together with the team, strategies that can favor the adherence of people with NCDs, with groups of people with DM, and evaluate the lower limbs to identify potential signs of risk, alert to the development of diabetic foot, adding guidelines for self-care ( KOLCHRAIBER *et al.*, 2018). A study carried out in 2013, compared the nurses' responses with the assessment of the feet of the 40 participants, it was noted that, when guidance on the use of appropriate footwear is addressed, the nurse states that he carries out this guidance in 100% of his encounters with people diagnosed with DM2. However, 85% of participants in this same study stated that they use inappropriate footwear, with pointed toes, heels, dry shoes, tight or very loose shoes, with emphasis on the large scale use of rubber flip-flops or similar. This result led to the

discussion of the presence of two hypotheses: the guidance is not actually being provided by the nurse or the user does not have access to another type of footwear, regardless of the guidance they have received (CUBAS *et al.*, 2013). In the present study, the result was more worrying as the subjects declared that they had not received any guidance. It is worth mentioning that, although in general the lines of care are still organized by disease, it is essential that the team fully evaluates the user of the health service, as DM is commonly associated with other risk factors/diseases. It is important not to organize care in primary care in a fragmented way, by disease, and it is essential to guarantee access and longitudinal care for all people regardless of what problem they have (BRASIL, 2013a).

After the advent of insulin in the 1930s for the treatment of DM, the prevalence of diabetic neuropathy (DN) showed a significant increase, as people with DM began to have a longer life expectancy (NASCIMENTO *et al.*, 2016). Faced with an alarming number of individuals with DM, the prevalence of DN has followed this growth and is already emerging as the main cause of peripheral neuropathy (PN) in developed countries. NP stands out for being the most prevalent microvascular complication, estimating that at least half of the population with DM will develop this neuropathy at some point in their clinical evolution (NASCIMENTO *et al.*, 2016). Most symptomatic individuals experience positive sensory symptoms (excessive response to a stimulus or spontaneously), such as paresthesias and pain, however, in some cases they may present proprioceptive ataxia, which are identified as sensations of numbness, tingling, shocks, stinging, especially burning, and imbalance events and falls. These changes are distributed in the extremities of the lower limbs (LL) – in the feet –; which can progress to the upper limbs (upper limbs) and individuals typically report worsening at night. These are generally mild symptoms, but they can be intense and disabling. Negative sensory symptoms (reduced response to a certain stimulus) are those referred to as loss of sensitivity in the involved limb (NASCIMENTO *et al.*, 2016).

On neurological examination, the presence of distal hypoesthesia/hyperesthesia in the segments is verified, initially in the thermoalgesic modalities of sensitivity. In the presence of significant painful neuropathy, the presence of hyperesthesia (exaggerated responses to tactile stimuli), hyperalgesia (exaggerated sensitivity to painful stimuli), hyperpathy (persistence of pain even after removal of the painful stimulus) or even allodynia (painful sensation caused by non-painful stimuli). It can progress to hypo/anesthesia of deep sensitivity such as tactile, vibratory and proprioceptive. Furthermore, when there is sensory impairment of thick fibers, deep hypo/areflexia is observed, primarily in the aquilian reflex, and global areflexia may be found in severely affected cases. (NASCIMENTO *et al.*, 2016). Diagnosis carried out early and correctly allows for adequate treatment, avoiding the progression of neuropathy and serious complications. To do this, it is necessary to obtain a careful clinical history, in addition to a thorough neurological examination and complementary tests, in order to identify signs of impairment of nerve fibers. Its treatment depends on adequate glycemic control and, when present, treatment of neuropathic pain (NASCIMENTO *et al.*, 2016). Diabetic neuropathy (DN) is defined as peripheral, somatic or autonomic nerve damage attributable solely to Diabetes Mellitus. Considering the motor, sensory and functional damage caused by this disorder, the role of physiotherapy becomes essential to promote better treatment for patients, contributing considerably to the rehabilitation of physical and sensory changes, in addition to prevention through exercise. stretching, strengthening, gait training, balance and adaptation of prostheses and orthoses to reduce foot sequelae, promoting a better quality of life (XAVIER *et al.*, 2021). Physiotherapeutic interventions produce satisfactory effects, as they provide an improvement in blood flow to the lower limbs, contributing to wound healing, reducing endoneurial hypoxia and improving nerve conduction (XAVIER *et al.*, 2021). In this study, in relation to the clinical examination of the feet and the significant number of people who stated that they had never had their feet evaluated by a health professional, it is noticeable that the professionals of this health equipment are unaware of these

complications, given that the clinical examination of the feet is extremely important in preventing lower limb amputation. This examination is based on the identification and classification of the risk of ulceration, early treatment and the adoption of educational measures (RAMOS *et al.*, 2020). Regarding sensitivity assessment, studies have shown that it is undervalued and rarely investigated by health professionals, especially in primary care. It is important to highlight that the evaluation and analysis of symptoms in order to prevent ulcerations and amputations of extremities is essential (RAMOS *et al.*, 2020). Clinical examination of the feet is a practice that translates into a protective factor against the development of ulceration, yet the majority of people with DM have never undergone this examination. In 2020, a study showed that the main changes in the foot of individuals with DM occurred in the perception of vibration in the hallux and in the ankle reflex, which are caused by the deterioration of peripheral nerve endings, resulting in greater risk for these people. have trauma or injuries to their feet. In other words, the loss of vibration sensation and ankle reflex is a significant risk factor for the development of foot ulcers, as these clinical manifestations are associated with amputation due to diabetic neuropathy (LIRA CAETANO *et al.*, 2020).

The primary objective of periodically evaluating the feet of people with DM is ulcer prevention. Despite this, the progression to the development of foot ulcers is common: it is estimated that the risk of foot ulceration throughout the life of an individual with DM can reach 25%. In these cases, therefore, the objective is wound healing (such as prevention of amputation) and prevention of recurrent ulcers (BRASIL, 2016). The risk of developing serious chronic complications is many times higher than that of people without diabetes, being: 30 times more for blindness, 40 times more for lower limb amputations, 2 to 5 times more for acute myocardial infarction (AMI) and 2 3 times more for cerebrovascular accident (CVA) (BRASIL, 2013a). Regular assessment of the feet of people with DM should be carried out by highly qualified professionals (the family doctor or, preferably, the nurse), according to the recommended frequency (BRASIL, 2016). However, in situations in which the team's demand makes it impossible for these professionals to evaluate the entire population with DM within the appropriate period, the team must evaluate the possibility of training technical nursing professionals (from the team's ongoing education moments) for the selection of users who present changes in the diabetic foot, forwarding altered or suspected cases to higher-level professionals (BRASIL, 2016). The educational approach for people with DM to prevent the occurrence of foot ulcers and to establish adequate daily care of the lower limbs is essential to avoid unnecessary hospitalizations and amputations (BRASIL, 2013a). Considering that 99% of the daily care necessary for the treatment of diabetes is carried out by the person with DM or their family members, the biggest challenge for health professionals is to establish an effective health education process to promote the development of self-care. It is essential that the multidisciplinary team broadens its perspective on the person with DM, seeking to identify elements of daily life that can pose risks and trigger complications. The precursor elements of these complications, when analyzed, point to the health education and assistance actions that must be carried out for timely prevention (BRASIL, 2016). There is consistent evidence that organized assessment and monitoring programs for people with DM for diabetic foot injuries reduce amputation rates when compared to conventional care. Given the frequency and severity of this complication in the population with DM, it is therefore mandatory that the primary care health team organizes itself to provide this care to the community in its territory of coverage (BRASIL, 2016).

## CONCLUSION

Diabetic foot was more prevalent in elderly females, 57.66%, carriers of DM2. The large number of people who stated that they did not receive guidance on how to take care of their feet draws attention, that is, the majority of service users with a diagnosis of DM are unaware of foot care, which is essential to avoid complications, deformities

and amputations. Although there are some methodological limitations, the results point to the need to adopt actions aimed at these people monitored in primary care, especially in health promotion and prevention of DM complications.

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