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## Fatores relacionados ao desenvolvimento de úlceras em pacientes com Diabetes Mellitus

Factors related to the development of ulcers in patients with Diabetes Mellitus

Factores relacionados al desarrollo de úlceras en pacientes con Diabetes Mellitus

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### ABSTRACT

**Objective:** To identify factors related to the development of ulcers in the lower limbs of insulin-dependent users residing in the city of São José de Mipibu/RN. **Method:** Quantitative research; we obtained data through interview followed by static inspection and application of Semmes-Weinstein monofilaments to assess the threshold of plantar tactile sensitivity. The Ethics Committee of the Potiguar University of Natal/RN approved this research, under the Certificate of Presentation for Ethical Consideration number 0037.0.052.000-11. **Results:** The age range was 21-72 years old; 68.4% were female; 63.3% were living in urban areas. We can highlight as factors related to development of ulcers in the lower limbs: sedentary lifestyle (71.6%), hypertension (65%) and a history of cardiovascular disease (56.7%). In the evaluation of the feet, 26.7% had dry skin; 15% had scaly skin; 38.3%, farinaceous nails; 30%, thickened nails and 35%, dermatitis. Regarding the tactile sensitivity, 18.3% had anesthesia of the affected limb. **Conclusion:** The data suggests that this population is likely to develop more severe and disabling complications of Diabetes Mellitus.

**Descriptors:** Nursing; Diabetes Mellitus; Diabetic Foot.

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## RESUMO

**Objetivo:** Identificar fatores relacionados ao desenvolvimento de úlceras em membros inferiores de usuários insulinodependentes residentes no município de São José de Mipibu/RN. **Método:** Pesquisa quantitativa; os dados foram obtidos mediante entrevista seguida da inspeção estática e aplicação dos monofilamentos de Semmes-Weinstein para avaliação do limiar da sensibilidade tátil plantar. Pesquisa aprovada pelo Comitê de Ética em Pesquisa da Universidade Potiguar de Natal/RN, CAAE 0037.0.052.000-11. **Resultados:** A faixa etária foi de 21 a 72 anos; 68,4% do sexo feminino; 63,3% residentes em zona urbana. Fatores relacionados ao desenvolvimento de úlceras em membros inferiores: sedentarismo (71,6%), hipertensão (65%) e antecedentes de doenças cardiovasculares (56,7%). Na avaliação dos pés, 26,7% pele ressecada, 15% descamativa, 38,3% unhas farináceas, 30% espessadas e 35% dermatites. Quanto à sensibilidade tátil, 18,3% apresentaram anestesia do membro afetado. **Conclusão:** Os dados sugerem que a população estudada é suscetível a desenvolver complicações mais severas e incapacitantes do Diabetes Mellitus.

**Descritores:** Enfermagem; Diabetes Mellitus; Pé Diabético.

## RESUMEN

**Objetivo:** Identificar factores relacionados al desarrollo de úlceras en miembros inferiores de usuarios insulinodependientes residentes en el municipio de São José de Mipibu/RN. **Método:** Investigación cuantitativa; los datos fueron obtenidos mediante entrevista seguida de la inspección estática y aplicación de los monofilamentos de Semmes-Weinstein para evaluación del umbral de la sensibilidad táctil plantar. Investigación aprobada por el Comité de Ética en Investigación de la Universidad Potiguar de Natal/RN, CAAE 0037.0.052.000-11. **Resultados:** El grupo fue de 21 a 72 años; 68,4% de sexo femenino; 63,3% residentes en zona urbana. Factores relacionados al desarrollo de úlceras en miembros inferiores: sedentarismo (71,6%), hipertensión (65%) y antecedentes de enfermedades cardiovasculares (56,7%). En la evaluación de los pies, 26,7% piel ressecada, 15% descamada, 38,3% uñas farináceas, 30% espesadas y 35% dermatitis. Referente a la sensibilidad táctil, 18,3% presentaron anestesia del miembro afectado. **Conclusión:** Los datos sugieren que la población estudiada es susceptible a desarrollar complicaciones más severas e incapacitantes del Diabetes Mellitus.

**Descriptor:** Enfermería; Diabetes Mellitus; Pie diabético.

## INTRODUCTION

In Brazil and other Latin American countries, life expectancy has shown gradual increase due to the improvement of health services and the epidemiological profile of diseases. There has been a reduction of morbidity and mortality from infectious and parasitic diseases and increased morbidity and mortality for Chronic Non Communicable Diseases (NCDs), including diabetes mellitus (DM), which is challenge for healthcare professionals, given the difficulties of patients in adhering and adapting to treatment.<sup>1</sup>

In other countries, like the United States, it is clear that leg ulcers (LU) affect an average of 1-2% of the population in their process of life, compelling about 6.5% million of

morbidity, given that this rate has increased by changes in lifestyle and aging of the population. In Brazil, LUs have an estimate of about 3%, which rises to 10% in patients with DM.<sup>2</sup>

Diabetes mellitus is a group of metabolic diseases with elevated glucose levels, caused by total or partial insulin deficiency or resistance thereto. It is a chronic disease and the contributing factors are the highest rates of urbanization, sedentary lifestyle, type and time of diagnosis, inadequate control of blood glucose, smoking, alcoholism, obesity, hypertension, lack of good hygienic habits in foot care and lack of exercise, requiring psychological, social and physical adjustment, which makes family interaction crucial to overcome this whole process. Diabetes mellitus is also associated with increased mortality due to the high risk of developing acute complications such as hypoglycemia, diabetic ketoacidosis, hyperosmolar coma, retinopathy, nephropathy, ischemic heart disease, cerebrovascular disease, peripheral vascular and neuropathic disease.<sup>1</sup>

According to the International Consensus on the Diabetic Foot, this is one of the prevalent chronic complications of DM. The diabetic foot is a multifaceted physiological state whose characteristics are the presence of foot injuries caused by peripheral and/or neurological vascular changes, which forms the triad: neuropathy, peripheral vascular disease and infection. If this injury is not diagnosed immediately, it can progress to gangrene and limb amputation.<sup>3-4</sup>

Literature reports that health professionals need to evaluate the feet of people with diabetes more systematically in order to recognize the risk factors that can modify or enhance self-care, in addition to the adequate metabolic control, which will largely reduce the risk of ulceration and amputation. Epidemiological data on occurrences of diabetic foot and amputation, especially in relation to factors diagnosed in primary care, are still scarce in the literature.<sup>5-6</sup>

Feet problems bring on important chronic complications. The diabetic foot comprises a range of pathophysiological processes ranging from infection, ulceration and/or destruction of deep tissue to neurological abnormalities and/or vascular impairment, causing suffering in the individual's lifestyle and quality of life. Added to this, there are also high social and economic costs due to amputations, which are an important factor of incapacity, disability, early retirement and preventable deaths. Amputations could be prevented with simple, low-cost care. A study conducted with elderly reported reduction from 44 to 85% of this procedure, with only preventive care.<sup>7</sup>

A descriptive cross-sectional study, conducted in Belo Horizonte/MG, showed no prevalence of complicated DM in the population, however, the data provided by the Municipal Health Department revealed that in 2004, there was an equivalent percentage of amputations on the thigh compared to the toes in the diabetic group of 31% and 33%, respectively.<sup>8</sup>

The partnership with diabetic groups appears as a new therapeutic way and experience has shown that these groups conducted by an interdisciplinary team are of great value to address both risk individuals and those with established disease.<sup>7</sup> The importance of preventing or delaying complications in diabetic foot patients to the most complex level of care is relevant given that the interdisciplinary team provides subsidies for better primary care regarding prevention of this disease on quality of life of individuals, from a targeted and accompanied therapeutic proposal.<sup>9</sup>

Faced with this problem and understanding that DM represents a major problem in public health, we decided to investigate this issue. Moreover, being students of the Graduate Nursing Program we could deal with diabetic patients in imminent risk for amputation during internships at health facilities, which awakened attention and motivation to deal with these individuals.

Given this context, the authors wondered: what is the social and health profile of these diabetic patients? What is their risk to develop ulcers in the lower limbs? Based on this premise, we aimed to describe the profile of insulin-dependent users residing in São José de Mipibu/RN and to identify factors related to the development of ulcers in the lower limbs.

## METHOD

This is a cross quantitative research aimed to describe the factors related to the development of ulcers in the lower limbs with 60 insulin-dependent users, residing in São José de Mipibu/RN and registered in the *Estratégia Saúde da Família* (Family Health Strategy – ESF).

The studied population consisted of individuals diagnosed with Diabetes Mellitus undergoing insulin therapy and living in the coverage area of the ESF team and of the *Núcleo de Apoio à Saúde da Família* (Family Health Support Center – NASF) and enrolled in *SisHiperdia* Program. There are a total of 615 individuals with diabetes in the city, of which 139 take insulin and 71 live in the coverage area of NASF A. Thus, we determined a sample plan at 5%, resulting in a random sample of 60 residents that was stratified proportionally according to urban and rural areas.

Data collection was conducted from September to October 2011. The instrument for data collection was a structured form for performing the interview, followed by static inspection and application of Semmes-Weinstein monofilaments to evaluate the threshold of plantar tactile sensitivity.

Data were organized in Microsoft Excel 2010 program and analyzed in descriptive and statistical manner. This study was approved by the Research Ethics Committee of Universidade Potiguar of Natal/RN (UNP), Certificate of Presentation for Ethical

Consideration number 0037.0.052.000-11, and by the Municipal Health Department of São José de Mipibu/RN, respecting the principles that guide and advocate Resolution 196/96 of the Brazilian Health Council, which deals with research with human beings.

## RESULTS

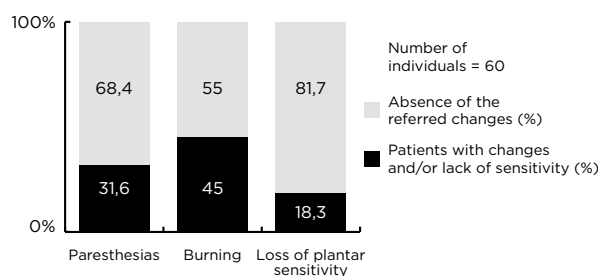
According to the sample of insulin-dependent diabetic individuals, the prevalence was of female (68%) compared to male patients (32%). The ages ranged from 21 to 72 years old, and 60% were aged less than 51 years old. Regarding marital status, 57% were married, 19% were single and 24%, others. Considering the level of education, 48.3% had elementary education, 30% were illiterate, 18.4% had secondary education and 3.3% higher education.

With regard to the time of diagnosis, 63% individuals have been diabetic for five years or more and 37% for less than five years. The duration of the disease is an important factor and indicative of seriousness to the appearance of ulcers in the lower limbs. Regarding nutritional status, 43.4% were overweight, 40% were obese and 16.6%, eutrophic. As for the associated factors and concomitant diseases presented by the participants, 71.6% were sedentary, 65% were hypertensive, 56.7% had a family history with heart disease and 13.3% were smokers.

We found that 30% already had retinopathy, 25% stroke, 23% nephropathy, 18% amputations, 15% coronary artery disease and 10% acute myocardial infarction. The skin changes highlighted by the participants were: 38% had farinaceous nails, 35% dermatitis, 30% thickened nails, 27% dry skin, 15% scaly skin and 7% foot ulcers.

Next, regarding circulatory changes, 45% reported pain at rest, 30% edema in the lower limbs, 18% claudication, 12% paleness when elevating the leg, 12% lack of dorsalis pedis pulse and 8% signs of ischemia in the lower limbs. Figure 1 shows the changes of the participants as for plantar sensitivity identified through Semmes-Weinstein monofilament test.

**Figure 1** - Profile of insulin-dependent patients as for plantar sensitivity from conducting Semmes-Weinstein monofilament test



Source: current research, Natal/RN (2013).

## DISCUSSION

Since the age group of 60 years old or older was prevalent, there is need to include this age group as a priority in health surveillance agenda, given that this age group is constantly found in studies about the theme, especially considering the aging under unfavorable socioeconomic and nutritional conditions in most of the population.<sup>10</sup>

Studies reveal similar features with highlight to females. Survey data found a higher prevalence of diabetes in the population with venous insufficiency. This factor may be related to female longevity, given that female hormones, such as estrogen, increase venous capacitance and progesterone weakens vascular wall,<sup>11</sup> which corroborates this research.

This study also found low levels of education, which is common factor in both national and international studies. These data corroborate a research in two clinics for vascular surgery in the city of Fortaleza/CE, showing that the population served had low income and low education.<sup>12</sup>

The findings of this research are relevant in view of women with little education (30% are illiterate) and probably with low income. A study showed that this feature affects the management of venous ulcers (VU), since the treatment is costly for patients and families, which brings on extension and chronicity of injuries,<sup>2</sup> considering that if the carriers do not have adequate resources to the correct treatment, this makes them unable to reach the health unit seeking for multidisciplinary care and supplies so they can receive dressings for their injuries.

It is important to maintain high vaccination coverage for diabetic individuals due to chronic complications such as diabetic foot, since tetanus is a toxic infection caused by the tetanus bacillus's toxin introduced into the body through skin or mucosal wounds or lesions contaminated by dust, soil, animal or human's feces, open fractures with torn tissue and foreign bodies.<sup>13</sup>

Counseling concerning alimentation shall incite efforts so that there is interaction with all family members, encouraging them in the pursuit of healthy eating habits, thus avoiding overweight. The prevalence of diabetic subject with obesity is, in most cases, pre-morbid state. They need family support in the education process regarding eating habits, taking into account the economic, cultural and social aspects to meet the family's needs, concerns and feelings about the quality, quantity and fractionation of food.<sup>14</sup>

The use of insulin is common to all study participants. When asked about the time of use, the results revealed that 47% have been insulin-dependent for five years or more and 53% for less than five years. Of the 60 diabetic patients, 80% have used oral hypoglycemic drugs along with insulin.

Research has shown that the healing time of the lesions is a challenging process for nurses, as they progress rapidly and have in their bed microorganisms acting as determining factors for infections and long periods to their complete healing. The presence of edema resulting from venous reflux

is also a factor that predisposes to VU, hindering the effective treatment of complicated leg ulcers.<sup>2,15-17</sup>

The low level of smoking in the study population is a positive factor, as tobacco consumption constitutes an aggravating to occlude arteries and arterioles, since peripheral atherosclerotic vascular disease is one of diabetic complications and that appears prematurely.<sup>18</sup>

The elimination of advertising and of activities that promote tobacco products are meant to reduce the incentives for the initiation and to deconstruct the positive social acceptance of smoking.<sup>19</sup>

Sedentarism was evident in the population studied in 71.6%. A study points out that this habit has important interaction with genetic susceptibility, collaborating with increased risk of developing diabetes and its complications. Allied to this, hypertension is one of the criteria for detection of the disease in asymptomatic individuals as it is intrinsically linked as an associated and triggering factor for coronary heart disease and complications such as retinopathy and nephropathy.<sup>20</sup>

Cardiovascular ischemic diseases are more frequent and appear prematurely in patients with diabetes. Diabetic retinopathy, which was reported in 30% of cases in this study, is the main form of irreversible blindness and is asymptomatic in the early stages but evolves over time, affecting the majority of diabetic individuals after 20 years of disease. Diabetic nephropathy, which appeared in 23% of patients with DM interviewed is also a common and devastating complication, comprising a set of clinical syndromes, usually affecting toes, then feet and legs. The distal muscle weakness assails the patient slowly as a disablement with bone deformity that affects the sensory, motor and autonomic peripheral nervous system, in isolated or diffuse way in the proximal or distal segments, with acute or chronic installation, reversible or irreversible nature, appearing silently or with dramatic symptomatic picture, featuring high-risk group for amputation, evidenced by insensitivity to monofilament as for tuning fork.<sup>21</sup>

In the case of early diagnosis of patients at risk for neuropathy in routine consultations in the Family Health Strategy (ESF), the use of Semmes-Weinstein 10g and the tuning fork of 128Hz is the ideal. Failure to comply with such use in ESF brings a silent form of the disease related to high risk for amputation,<sup>22</sup> since the research enabled us to identify 18% of participants with no plantar sensitivity during the evaluation of threshold of cutaneous tactile perception in the foot, which is a warning sign for diabetic patients, and the complications become more frequent at this level, evidencing loss of the mechanism of protection and defense of feet.

Research has shown high rates of relapses in VU when not handled properly, of which 30% relapse within the first year and 78% after up to two years. This is precisely due to inadequate management in taking care of injuries, related to a number of factors, not only when the responsibility is of

the health services, but also due to the actions and behavior changes of patients.<sup>2,23</sup>

Claudication is a clinical manifestation with peripheral failure, reaching, in most cases, the calf in the presence of stenosis or arterial obstruction<sup>24</sup>, and it was observed in this study a percentage of 18%. The pain at rest is a circulatory critical condition that may be caused by the inflammatory process associated with injury or even involvement of peripheral nerves. The onset of pain is frequent and with variable intensity in VU, and worsens in the end of the day and improves by lifting carrier's limbs. Thus, the proper management of this patient with pain allows less interference in the activities of their daily lives, given that in this study the diabetic subjects had 45% of pain at rest.<sup>25</sup>

Of the participants, 37% reported paresthesia in the lower limbs and 45% burning sensation in the plantar region with exacerbation at night. The exposed paresthesia conditions are important parameters for evaluating the nurse in the care process, which allows determining the basic interventions and planning educational activities according to needs of diabetic patients.<sup>18</sup>

We concluded that the nurse plays a fundamental role with regard to the care to individuals with lower limb ulcers and plays a key care when dealing with such wounds. This professional monitors the injury, directs and executes the making of dressing efficiently and effectively. They are directly related to wound care, whether in primary, secondary or tertiary care services, maintaining intensive observation in relation to the associated factors and the development of diabetic foot ulcers, which affect the appearance of the wound or interfere in the healing process.<sup>26</sup>

## CONCLUSIONS

After analyzing the data, we identified factors associated with the development of lower limb ulcers in research participants and this can be found and linked to socioeconomic variables and factors that predispose the diabetic patient. Due to the precariousness of secondary health services to individuals with diabetic foot in the various municipalities in the state in question, complications and interventions tend to occur, of which the most invasive one is the amputation.

The study also pointed to the conditions that can aggravate these factors, including signs and symptoms such as pain at rest, claudication, and ulcers in the lower limbs, which should be more widely investigated for possible intervention. Physical examination also has its importance, including thorough evaluation of the feet, which is rarely done and observed by health professionals. We also highlight the diabetic neuropathy, which culminates in insensitivity of the member with several complications, and consequently, amputation of the foot.

It is essential that nurses in their care practice are able to identify early abnormalities to provide continuing education

and offer preventive care to the risk category identified, minimizing the development of the most severe and disabling complications that DM can cause.

The relevance of the study is, due to the high incidence and high rates of complications that disable its carriers, aimed at providing the nurse with a new form of care by looking at prevention and health promotion and at assessing and minimizing the risk of patients with diabetic foot. It also contributes to the production of knowledge to be used in healthcare practice of professionals who care for people with diabetes and its complications, ensures better quality of life for this population, avoiding illness, hospitalizations and subsequent public spending, and also contributes for future research that address this theme.



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