

## Characteristics and treatment of diabetic foot ulcers in an ambulatory care

Caracterização e tratamento de úlceras do pé diabético em um ambulatório

Características y tratamiento de las úlceras diabéticas en un cuidado ambulatorio

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### ABSTRACT

**Objectives:** To characterize diabetic foot's ulcers of patients treated at a first aid post and to investigate the treatment given to these lesions. **Methods:** Descriptive study with a quantitative approach, carried out in a first aid post of a university hospital, with 56 patients as subjects. For the data collection, a guideline was used, addressing sociodemographic and clinical data, characterization data and treatment data of diabetic foot ulcers. **Results:** The age range of individuals ranged from 38 to 84 years. It was found that 40 (71.4%) had a family record of diabetes. Regarding wound classification, 27 (34.6%) presented lesion in the plantar fascia and 20 (35.7%) presented shedding in the wound bed. Regarding the treatment, essential fatty acids were used in 45 (80.3%) of the lesions. **Conclusion:** Results reinforce the importance of the characterization / evaluation of the lesions to choose an effective treatment, which reduces the severity of complications.

**Descriptors:** Diabetic foot, Nursing care, Wound healing.

### RESUMO

**Objetivo:** Caracterizar as úlceras do pé diabético de pacientes atendidos em um ambulatório e investigar qual o tratamento dispensado a estas lesões. **Método:** Estudo descritivo com abordagem quantitativa, realizado no ambulatório de um hospital universitário, tendo como sujeitos, 56 pacientes. Para a coleta de dados, foi utilizado um roteiro abordando dados sociodemográficos e clínicos, dados de caracterização e de tratamento das úlceras do pé diabético. **Resultados:** A faixa etária dos indivíduos variou de 38 a 84 anos. Verificou-se que

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40 (71,4%) tinham histórico familiar de diabetes. Quanto à classificação da ferida, 27 (34,6%) apresentavam a lesão na fáscia plantar e 20 (35,7%) apresentavam esfacelo no leito da ferida. Em relação ao tratamento, em 45 (80,3%) das lesões foi utilizado ácidos graxos essenciais. **Conclusão:** Os resultados reforçam a importância da caracterização/avaliação das lesões para escolha de um tratamento eficaz, o que reduz a gravidade de complicações.

**Descritores:** Pé diabético, Cuidados de enfermagem, Cicatrização de feridas.

## RESUMEN

**Objetivos:** Caracterizar como úlceras do pé diabético de pacientes atendidos em un ambulatorio e investigar el tratamiento dispensado a estas lesões. **Métodos:** Estudio descriptivo com abordagem quantitativa, realizado sin ambulatorio de un hospital universitario, teniendo como sujetos, 56 pacientes. Para una coleta de datos se utilizó un roteador de datos médicos y datos clínicos, datos de caracterización y tratamiento de las úlceras del péptido diabético. **Resultados:** A faixa y tipos variados de 38 a 84 anos. Verificou-se que 40 (71,4%) tienen historia familiar de diabetes. (34,6%) presentaban una lesión en la planta plantar y 20 (35,7%) presentaban esfacelo no leito da ferida. Em relação ao tratamento, em 45 (80,3%) de las lesiones de los ácidos graxos esenciales. **Conclusión:** Los resultados refuerzan la importancia de la caracterización / evaluación de las opciones para la selección de un tratamiento eficaz.

**Descriptor:** Pie diabético, Atención de enfermeira, Cicatrización de feridas.

## INTRODUCTION

Among chronic degenerative diseases with high morbidity and mortality rates, Diabetes Mellitus (DM) has been highlighted as an important public health issue. This is because each year its incidence increases in the world population, which generates expensive expenses with treatment and consequent cooling of the quality of life of the people who suffer from this illness.<sup>1</sup>

DM is a multifactorial complication disease, with diabetic foot being one of the most common and devastating, due to the large number of cases that develop for lower limb amputations.<sup>2</sup> The prevalence of foot ulcers reaches 4% to 10% of affected persons for DM, about 40% to 60% of non-traumatic lower limb amputations occur in these patients, of which 85% are preceded by foot ulcers.<sup>3</sup>

Diabetic foot comprises a range of pathophysiological processes ranging from infection, appearance of ulcers with consequent destruction of deep tissue, neurological abnormalities and/or vascular impairment, which causes suffering to the person's life quality.<sup>4</sup>

Faced with this issue, care with the feet of people living with DM involves several measures that require close collaboration and responsibility of both the patient and health professionals. Numerous studies point to the activity of health education as a form of prevention, nonetheless, there is incipience of national scientific production about the evaluation and treatment of diabetic foot ulcers already installed.

In a study carried out in *Rio Grande do Norte* State,<sup>4</sup> it was evidenced that due to the precariousness of the health services provided to individuals with diabetic foot, complications and

interventions were obtained, of which the most invasive was the amputation.

It should be emphasized that assistance to patients living with wounds should be provided in a comprehensive manner, since it involves physiological and emotional issues.<sup>5</sup> Moreover, the practice of caring for wounded individuals is a specialty within Nursing, recognized by the Brazilian Society of Dermatological Nursing. Hence, it is up to these professionals to improve their knowledge regarding the specifics of this area, in the sense of providing a resolute and quality assistance.

It must be also highlighted that the nursing professionals are legally supported in providing this care, since the Federal Nursing Council regulates, through the Resolution No. 501/2015, the competence of the nursing team in wound care, as well as points out the nurse's autonomy when assessing and prescribing medicines and also wound dressing.<sup>6</sup>

Given the aforementioned issue, the following research questions were established: What are the characteristics of diabetic foot ulcers of patients treated at a first aid post? What are either the wound dressings or medications used to treat those lesions? Bearing these considerations in mind, this study aimed to characterize diabetic foot ulcers of patients assisted at a first aid post, and also to investigate the treatment given to those lesions as well.

## METHODS

It is a descriptive study with a quantitative approach that was performed with 56 patients with diabetic foot ulcers, who were assisted in a first aid post from a University Hospital located in the *Paraíba* State.

The population of the present study consisted of patients with diabetic foot ulcers, who were assisted by the Registered Nurse in the ambulatory service from the aforesaid research field, during the period stipulated for collection (from May to June 2015).

As inclusion criteria, patients older than 18 years old that attended the ambulatory service were selected for the treatment of diabetic foot ulcers. Patients that looked for the service but who had wounds that were not characterized as diabetic foot ulcers, and patients unable to provide the requested information in the data collection were then excluded.

A structured guideline was used for data collection, which was divided into three parts. The first dealt with sociodemographic and clinical data; the second one dealt with the wound characterization process, whose data were extracted from the Pressure Ulcer Scale for Healing (PUSH) scale and the Barbara Bates-Jensen scale; and the third presented data on cleanliness and treatment.

The PUSH scale is used for the evaluation and characterization of the healing process of pressure lesions, but in Brazil, one of its versions was adapted and validated for monitoring of leg ulcers.<sup>7</sup> The Barbara Bates-Jensen scale, known as Pressure Sore Status Tool (PSST), is used to evaluate the process of wound healing, through the parameters of wound size, amount of exudate and tissue.<sup>8</sup>

Considering the data analysis, the absolute and frequency distributions were calculated for the studied variables. Furthermore, the data were discussed according to the relevant literature.

The research was approved by the Research Ethics Committee from the institution linked to the study, under the *Certificado de Apresentação para Apreciação Ética (CAAE)* [Certificate of Presentation for Ethical Appreciation] No. 34719914.5.0000.5182, then respecting the principles according to the Resolution No. 466/12 from the Council National Health that guide the development of researches with human beings.

## RESULTS

Considering the 56 patients, 35 (62.5%) were males and 38 to 84 years old, 34 (60.6%) were between 58 and 75 years old. Observing the education, 20 (35.7%) had incomplete elementary education and 18 (32.1%) were illiterate. Considering the marital status, 32 (57.1%) were married; and, 40 (71.4%) did not present occupational activity, then being retired.

Regarding the clinical profile, it was found that 53 (94.6%) were not smokers, but 53 (94.6%) were non-smokers. With regards to the family history of DM, it was verified that 40 (71.4%) had some relatives diagnosed. As for the type of DM, 53 (94.6%) showed type 2 DM and 31 (55.3%) had an ulcer in the lower limbs from 1 to 10 years.

**Table 1** shows the characteristics of the study participants' diabetic foot ulcers.

**Table 1** - Characteristics of diabetic foot ulcers of the patients assisted at a first aid post. *Campina Grande* city, *Paraíba* State, 2015.

| Variable                   | n  | %    |
|----------------------------|----|------|
| <b>Anatomical location</b> |    |      |
| Plantar Fascia             | 27 | 34.6 |
| Amputated Hallux           | 23 | 29.5 |
| Calcaneus Region           | 10 | 12.8 |
| Front of the Foot          | 10 | 12.8 |
| Amputated Metatarsus       | 8  | 10.3 |
| <b>Amount of exudate</b>   |    |      |
| Scarce                     | 27 | 48.1 |
| Moderate                   | 18 | 32.2 |
| Abundant                   | 6  | 10.8 |
| None                       | 5  | 8.9  |
| <b>Type of exudate</b>     |    |      |
| Serohematic                | 26 | 46.3 |
| Hematic                    | 22 | 39.3 |
| Purulent                   | 4  | 7.2  |
| Serous                     | 4  | 7.2  |
| <b>Type of tissue</b>      |    |      |
| Dead shredded tissue       | 20 | 35.7 |
| Granulation tissue         | 20 | 35.7 |
| Epithelized tissue         | 10 | 17.8 |
| Necrotic tissue            | 6  | 10.8 |

\*Note: since many patients had more than one lesion, the anatomical location shows n = 78.

**Table 2** displays the products used for cleaning and treating the subjects' diabetic foot ulcers.

**Table 2** - Products used for cleaning and treating the diabetic foot ulcers of the patients assisted at a first aid post. *Campina Grande* city, *Paraíba* State, 2015.

| Variable  | n  | %    |
|---|----|------|
| <b>Products used for cleaning</b>                         |    |      |
| Chlorhexidine 0.2% and Physiological Saline Solution 0.9% | 49 | 87.5 |
| Physiological Saline Solution 0.9%                        | 7  | 12.5 |
| <b>Products used for treating</b>                         |    |      |
| Essential Fatty Acids                                     | 45 | 80.3 |
| Hydrogel  | 6  | 10.7 |
| Collagenase   | 3  | 5.4  |
| Silver Sulfate  | 1  | 1.8  |
| Biological Dressing                                       | 1  | 1.8  |

## DISCUSSION

A predominance of males was observed, this fact may be related to the better health care performed by women, as pointed out by a study carried out in a large municipality in the Brazilian South region.<sup>9</sup> It was identified that most practices related to lifestyle changes required to control DM and self-care with the feet in order to prevent ulcerations were more prevalent in females.

About the age, it was observed predominance from 58 and 75 years old, and it is inferred that this finding is due to the aging process of the country. The elderly people show noticeable cellular and extracellular changes, mainly a decline in physiological functions, a decrease in the body's ability to maintain homeostasis, and organic systems no longer function with full efficiency due to cell and tissue deficits, the results of these alterations imply susceptibility of the elderly to chronic diseases such as DM.<sup>10</sup>

The research also showed a low level of schooling, which represents an important risk factor, since the low level of education is a strong allied to the development of complications, because it influences the capacity of the individuals to assimilate the knowledge about the disease and the importance given to your control. This data has been evidenced in other studies, such as the study developed in *Minas Gerais* State, with factors associated with peripheral neuropathy in individuals with DM, which pointed out that 18.45% of the subjects were illiterate and 66.01% had primary education incomplete.<sup>11</sup>

With regards to marital status, the presence of a relationship is considered to be a spousal support for daily tasks and treatment, which is a positive factor. A study that investigates the quality of life of patients living with diabetic foot ulcers<sup>12</sup> corroborates the findings and shows that people living alone have a poor quality of life in the physical, psychological, social and environmental domains, if isolated because of their physical limitations.

Concerning the occupational activity, it is verified that the majority is retired, these data are expected, since the majority of the research subjects are elderly. It is also pointed out that due to incapacitating complications arising from diabetic foot ulcers, due to amputations, there are early retirements due to disability.<sup>4</sup>

Regarding the clinical profile, it was verified that the majority of the subjects of the studies did not present smoking and alcoholic activity. Similar to this is evidenced in a study investigating the prevalence of peripheral neuropathy in diabetics,<sup>11</sup> where alcoholism and smoking were observed in 12.62% and 9.71% of the cases, respectively. The same authors point out that smoking is related to decreased sensitivity in lower limbs, since nicotine triggers adrenergic responses that raise glucose values, suppressing insulin production.

It was verified that the majority of the individuals already had some relative diagnosed with DM, with family history mainly related to mother. This is very relevant because first-degree relatives of people with type 2 DM are two to six times more likely to develop the disease than controls without a family history.<sup>13</sup>

Regarding the DM type, it was observed that the most part show type 2 DM, but also, they live with an ulcer in the lower limbs from 1 to 10 years. The healing time is a relevant factor, because the microorganisms present are determining factors for the infections and long periods for their complete healing, this demands an intensive treatment by the nursing team.<sup>4</sup>

The assessment and classification of wounds constitutes an important part of the care process, and involves the patient's physiological and emotional recognition, the cause of wound onset and the wound surroundings.<sup>14</sup>

Regarding the characterization of the wound site, it was verified that the majority of patients had diabetic foot ulcers in the plantar fascia and amputated hallux. Sites in which diabetic foot ulcers commonly occur include the large toe plantar region, 30%; the head of the first metatarsal (hallux), 22%; the back of the fingers, 13%; the plantar region of other fingers, 10%; heel, 1%.<sup>15</sup>

In case studies evaluating care management for patients bearing diabetic foot ulcers,<sup>14</sup> localized lesions in the plantar fascia were found to occur due to discharge and increased vascular insufficiency in the area.

The exudate is produced by the increase of vascular permeability, being originated from specific reactions of the healing process. The amount of exudate must be controlled in a way that maintains moisture in the wound site. In addition, the reduction of its quantity and the improvement of its type are factors that indicate the evolution of the healing process.<sup>16</sup> The fact observed in the lesions of the subjects participating in this study, in which was observed a higher percentage of lesions presenting a quantity of either scarce or moderate exudate and type of serous or hematic exudate.

Serous exudate is related to clean lesions and is characterized by being plasmatic, transparent and aqueous, blood exudate indicates the presence of vascular lesion of the new fragile vessels that are appearing through the healing process.<sup>15</sup>

A study carried out in a venous ulcer repair clinic showed that 3 (5%) lesions drained purulent exudate, 4 (6%) hematic, 16 (24%) serohematic and 44 (65%) serous. Regarding the quantity, 26 (38.8%) ulcers drained a moderate amount of exudate, 25 (37.3%) drained a small amount and 16 (23.9%) drained a large amount of it.<sup>17</sup>

When observing the wound site, it was verified the predominance of dead shredded tissue and tissue of granulation. The latter corresponds to an important tissue in the healing process, of reddish coloration, with ample blood irrigation due to angiogenesis.

In case studies,<sup>14</sup> the discolored and friable granulation tissue was evidenced at the beginning of the treatment of all the lesions, suggesting the presence of biofilm, still, with the use of an antimicrobial dressing, the granulation tissue was taking the normal staining, indicating an evolution in the healing process.

The presence of necrotic tissue, such as dead shredded tissue or liquefaction necrosis, slows down the healing process and leaves the lesion more susceptible to infection. The process of diagnosis and treatment of an infection involves several factors, such as: history of injury and physical examination, laboratory evaluation, microbiology evaluation and diagnostic imaging. This implies high costs, since most of the time, the treatment is related to hospital admission.<sup>18</sup>

Cleaning and treatment are important elements in the preparation of the wound site. There is no specific treatment for diabetic foot ulcers, however, the general principles correspond to a dressing that protects the area from trauma and contamination, absorbs the exudate and keeps the wound occluded.<sup>19</sup>

In cleaning, the main products used were chlorhexidine 0.2% and Physiological Saline Solution 0.9%. The characteristics of an ideal wound cleansing solution are as follows: not to be toxic to human tissues, to maintain viable granulation tissue, to reduce the number of microorganisms, not to cause sensitivity reactions, to be widely available and to be inexpensive.<sup>5</sup> Physiological Saline Solution 0.9% fulfills these criteria, it is an isotonic solution, it does not interfere with the normal healing process and does not cause damage to the tissues, so it is even a choice for irrigation.<sup>20</sup>

With regards to the products used in the treatment, the use of most of the essential fatty acid lesions is observed. This fact can be explained by the fact that the outpatient units of the public health service do not always offer a diversity of products, making nurses to use the available dressing, considering the conditions of the lesion of each patient and always adapting to the nearest ideal.<sup>21</sup>

A particular study<sup>22</sup> shows the efficacy of other products in the treatment of diabetic foot ulcers, such as papain and hydrogel. The first solution consists of a complex mixture of proteolytic enzymes, which causes proteolysis, protein degradation in tissue amino acids, non-vitalization and necrosis, without altering the healthy tissue. Other characteristics of this substance are anti-inflammatory, bacteriostatic and bactericidal capacity. The hydrogel is composed of the association of water, carboxymethylcellulose

and propylene glycol, whose main function is to soften and remove devitalized tissues through autolytic debridement.

It is essential to highlight the relevance of the aspects raised in this study to nursing care, as well as to the scientific community in the area, in order to provide aspects that scientifically support the evaluation and treatment of diabetic foot ulcers. All this aims to minimize the impacts of the lesion already installed.

Pondering about the limitations of this research, unfortunately it was not possible to assess the lesions on more than one occasion, then demonstrating whether they get better or not by considering the treatment applied. It was due to the period scheduled for data collection. Therefore, it is suggested to carry out researches that are able to assess the diabetic foot ulcers in more than one occasion.

## CONCLUSIONS

The results reinforce the importance of characterizing/assessing the lesions in order to choose an effective treatment, which improves the likelihood of reducing the aggravations, such as amputations and consequent impairment of patients' life quality.

It ought to be underlined that this study points to contributions to the visibility and autonomy of the nursing professional since the same must be emphasized about advances and scientific discoveries, especially regarding the assessment and treatment of wounds.

It is recommended that studies of this nature may be undertaken, since even recognizing the relevance of the prevention of diabetic foot ulcers, there must be a protocol for the adequate treatment of the already installed injury, since the risk of amputation becomes greater, besides having an impairment in the quality of life of the affected patient.

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