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Conhecimento e fatores relacionados ao cuidado e prevenção do pé diabético

|Care and prevention of diabetic foot: perceptions of diabetic patients

Resumo| **Introdução:** *O pé diabético (PD) está relacionado com um aumento do risco de amputações em pessoas com Diabetes mellitus (DM) e o conhecimento sobre as práticas de cuidados com os pés pode prevenir o desenvolvimento do PD.* **Objetivos:** *Investigar o conhecimento sobre os cuidados com os pés e os fatores relacionados ao cuidado e prevenção do pé diabético em um grupo de pessoas com DM.* **Métodos:** *Este é um estudo de caráter quali-quantitativo, no qual foram incluídos indivíduos com diagnóstico clínico de DM que responderam a um questionário estruturado contendo questões sobre variáveis sociodemográficas, conhecimento sobre os cuidados com os pés, prática de cuidados com os pés, presença de lesões e amputações de membros inferiores.* **Resultados:** *Participaram do estudo 71 indivíduos diabéticos, com média de idade de 61,33 anos. Destes, 60,57% receberam informações, principalmente de médicos, sobre cuidados com os pés. Indivíduos que receberam informações praticaram mais ações de autocuidado. Houve diferenças na prática de cuidados com os pés entre homens e mulheres, e os homens apresentaram mais amputações. Indivíduos que praticaram mais ações de cuidados com os pés tiveram uma menor taxa de amputações. Além disso, foram encontradas relações entre a escolaridade e as formas de controle do DM e entre a escolaridade e o número de lesões nos pés.* **Conclusão:** *Informações sobre os cuidados com os pés são essenciais para encorajar medidas de autocuidado. Além disso, o gênero e a escolaridade podem ser importantes fatores a serem considerados na educação da pessoa com DM.*

Palavras-chave| *Diabetes mellitus; Pé diabético; Educação em saúde; Autocuidado.*

ABSTRACT| Introduction: Diabetic foot (DF) is related to an increased risk for amputations in patients with *Diabetes mellitus* (DM) and awareness about foot care practices may contribute to prevent DF development. **Objective:** To investigate knowledge about foot care and the factors related to care and prevention of diabetic foot in a group of diabetic patients. **Methods:** This is a quali-quantitative research, involving patients with clinical diagnosis of DM. They answered a structured questionnaire containing questions about socio-demographic variables, knowledge about foot care, engagement in foot care practices, injuries and amputations of the lower limbs. **Results:** The subjects of this study were 71 diabetic individuals with mean age of 61.33 years. Of these, 60.57% received information about foot care mainly from medical doctors. Individuals who received information were more committed to foot care practices. Differences between male and females were found in foot care activity profiles, with men presenting more amputations. Lower rates of amputation were detected in individuals who engaged in foot care activities. Furthermore, relationships were found between schooling level and forms of diabetes control, and schooling level and number of foot injuries. **Conclusion:** Information about foot care is essential to encourage foot care practices. Gender and schooling level should deserve a heightened focus when implementing foot health awareness programs for DM patients

Keywords| *Diabetes mellitus*; Diabetic foot; Health education; Self-care.

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INTRODUCTION |

Diabetes mellitus (DM) is a global epidemic syndrome affecting 350 million people worldwide, according to the World Health Organization[1,2]. Data on future DM prevalence among adults indicate an alarming growth of the condition, with a 7.7% increase projected for 2030, affecting 439 million of people[3]. In fact, this syndrome is one of the main threats to human health in the twenty-first century, being a major cause of premature disability and death[1]. DM is a chronic syndrome that starts when pancreas β-cells cannot produce sufficient insulin or when peripheral body tissues cannot effectively use the produced insulin[1-4]. This clinical condition results in a deregulation of glucose and leads to hyperglycemia[1-4]. It is well-established that hyperglycemia is at the root of many changes in organs and systems, both in humans and experimental animals[5]. According to the International Working Group on the Diabetic Foot[6], DM is associated with several short and long term complications. The most common long-term complications include diabetic foot and lower limb amputation[7].

Diabetic foot (DF) is characterized by infection, ulceration and / or destruction of foot tissues[6]. Indeed, there are indications that DF precedes approximately 85% of lower extremity amputations in DM patients and amputation rates are 9.22 and 11.67 times higher than in the non-diabetic population for men and women, respectively[8].

Lack of awareness about foot care measures may contribute to the increased number of amputations in diabetic subjects. Thus, a renewed focus on patient education on foot care may help prevent DF[9]. In effect, some studies have suggested that patient education results in reduction of ulcers and amputations, but comparatively few studies have dealt with this topic[10].

Therefore, we may well hypothesize that upon receiving information about foot care, individuals would engage more effectively in foot care and would have fewer foot injuries. Thus, the aim of this study was to investigate the level of awareness of diabetic foot care and foot care activity in DM patients, together with the associated factors which interfere with the overall care and prevention of this condition.

METHODS |

This was a quali-quantitative study, which included people with clinical diagnosis of DM, of all ages, both genders, cognitively able to understand and answer the proposed questionnaire. The exclusion criteria were women with gestational DM and subjects with difficulties of understanding and communication. The participants were selected using the "snowball" technique[11], which is a qualitative method whereby the set of interviewees is formed from one or two initials interviewed. In other words, it is a mapping of social networks through which data are collected until a point is reached when new information is no longer acquired.

Participation was voluntary and all interviewees signed a consent form. This research was approved by the Ethics Committee of the Federal University of Santa Maria [with the number 0132.0.243.000-09].

A questionnaire comprising of 46 opened-ended and multiple choices questions[12,13] was applied during home visits to subjects with DM. The proposed questions investigated characteristics such as gender, age, ethnicity, occupation, schooling years and marital status. The interview and measurements were carried out by the researchers. Anthropometric measurements of participants were taken to determine body mass index (BMI) and waist and hip circumference ratio (WHR), which are indicators for assessing body fat and body fat distribution, respectively. Questions about DM, such as type, diagnosis time, manners of treatment were included, along with questions on the lifestyle of the participants.

Furthermore, it was investigated whether subjects received (at any point in their lives) information from health professionals about foot care, and whether they engaged in foot care activities. Presence of foot injuries (ulcers, wounds, infection, swelling in the foot / ankle, change in temperature or color, fungal infections on nails, cracks in the skin, calluses, painful or sensitive areas), previous history of amputation, feet pain levels according to Visual Analog Scale of Pain and participation in support groups were also investigated.

Descriptive analyses were used to present the characteristics of participants. Chi-square test was used to analyze any statistically significant association between variables. Differences between variables were considered significant when $p \leq 0.05$.

RESULTS |

Table 1 presents the characteristics of DM subjects. Results showed that 63.37% of participants were female. General mean of age was 61.33 years, and mean years of schooling was 5.63 and 5.96 for women and men, respectively. 92.95% of individuals had type II DM, 46.47% were hypertensive and time of DM diagnosis was 10.82 years. Both body mass index (BMI) and waist-hip circumference ratio (WHR) were much higher than the recommended for gender and the individuals' mean age. BMI was higher in women than in men (30.53 and 28.71 kg/m², respectively) but the WHR was similar in both genders.

Table 2 shows the relationship between receiving and not receiving information about foot care and foot care practices. Evaluation of knowledge about foot care demonstrated that 60.57% of participants received information mainly from medical doctors (76.74%), nurses (11.62%), and other health professionals (11.64%), and information were received mainly through talking with the professionals (72.09% of cases) (data not show). 51% of the DM subjects who received information about how they should cut feet nails did it properly when compared to the 18% who did not receive any guidance (p=0.006). Moreover, 44% of the DM subjects who received information were able to orientate the person(s) in charge of their nail-cutting, when compared to 0.3% who did not receive this instruction [and practice the same action] (p=0.0001) (Table 2).

Table 1 - Characteristics of participants (n=71), Uruguaiana/RS, 2013

Variables	Women	Men	N (women/men)
Age in years (Mean)	62.97	59.10	
Male/Female	63%	37%	45 / 26
Schooling years (Mean)	5.63	5.96	
Ethnic Group			
White	44.44%	46.15%	20 / 12
Black	11.11%	3.84%	05 / 01
Others	26.66%	26.92%	12 / 07
Uniformed	17.77%	23.07%	08 / 06
Marital Status			
Married	37.77%	76.92%	17 / 20
Widowed	48.88%	3.84%	22 / 01
Divorced	11.10%	3.84%	05 / 01
Single	2.22%	15.38%	01 / 04
Occupation			
Retired	42.22%	69.23%	19 / 18
Home	48.88%	0%	22 / 0
Working	8.88%	19.23%	04 / 05
Unemployed	0%	11.53%	0 / 03
Type I diabetes	0%	3.84%	0 / 01
Type II diabetes	91.11%	96.15%	41 / 25
Diabetes type not informed	8.88%	0%	04 / 0
Diabetes duration (General mean - in years)	9.41	13.87	
Smoking	40%	46.15%	18 / 12
Alcoholism	24.44%	34.61%	11 / 09
Hypertension	46.66%	46.15%	21 / 12
BMI (kg/m²) [a]	30.53	28.71	
WHR [b]	0.96	0.96	

[a]Reference values of BMI for women= 24.4 kg/m² and for men= 24.9 kg/m².

[b]Reference values of WHR for women <0.74 and for men <0.90.

Table 2 - Relationship between receiving or not receiving information on foot care and practices of foot care (n = 71), Uruguaiana/RS, 2013

Questions	Yes		No						
	%	N	%	N					
Did you receive information about foot care?	60.57%	43	39.43%	28					
	Practices the foot care		Does not practice the foot care		Practices the foot care		Does not practice the foot care		
	%	N	%	N	%	N	%	N	p value
Do you wipe moist areas between your toes?	86%	37	14%	6	68%	19	32%	9	0.08
Do you normally examine the plantar region of your feet?	53%	23	47%	20	36%	10	64%	18	0.15
Do you know how a person with diabetes should cut their nails?	51%	22	49%	21	18%	05	82%	23	0.006*
Do you advise the person who cuts your nails?	44%	19	56%	24	03%	01	97%	27	0.0001*
Do you check if the shoes or socks leave marks in your feet?	51%	22	49%	21	36%	10	64%	18	0.23
Do you check your shoes before use?	72%	31	28%	12	68%	19	32%	9	0.79

*Represents *p* value < 0.05.

Figure 1 shows amputations incidence in subjects with DM that received or not information about foot care. Previous history of amputation was found in 8.45% of participants (five men and one woman). It was found that the subjects who received information about how to correctly dry between their toes showed a decreased risk of amputations (Figure 1) (p<0.05). Moreover, participants who are able to supervise the person(s) in charge of their nail-cutting and checking of their shoes before use had a lower incidence of amputations (p<0.001) (Figure 1).

Differences in foot care practice between men and women are shown in Table 3. Data indicate that despite receiving less information than men, women tend to take better care of their feet. This primarily reflects on the number of injuries and amputations, which are much higher in men (p = 0.002 and p = 0.01, respectively). In addition, women are more likely to resort to self-medication when compared to men.

Figure 2 shows the relationship between years of schooling and the monitoring of blood glucose, and between years of schooling and the number of foot injuries. An association was found between years of schooling, monitoring of blood glucose and number of foot injuries (p<0.001) (Figure 2A and 2B, respectively). Figure 2A shows that while fewer years of schooling correspond to greater use of drugs for DM control, more years of schooling are associated with non-pharmacological control of DM, such as dieting and exercising. Likewise, more years of schooling are related to fewer foot injuries (Figure 2B), and only participants with fewer than eight years of schooling presented more than three foot injuries.

DISCUSSION|

This study evaluated the knowledge and the factors related to care and prevention of diabetic foot. The results show

Figure 1 - Prevalence of amputations in subjects with diabetes that practice or not the foot care, Uruguaiana/RS, 2013
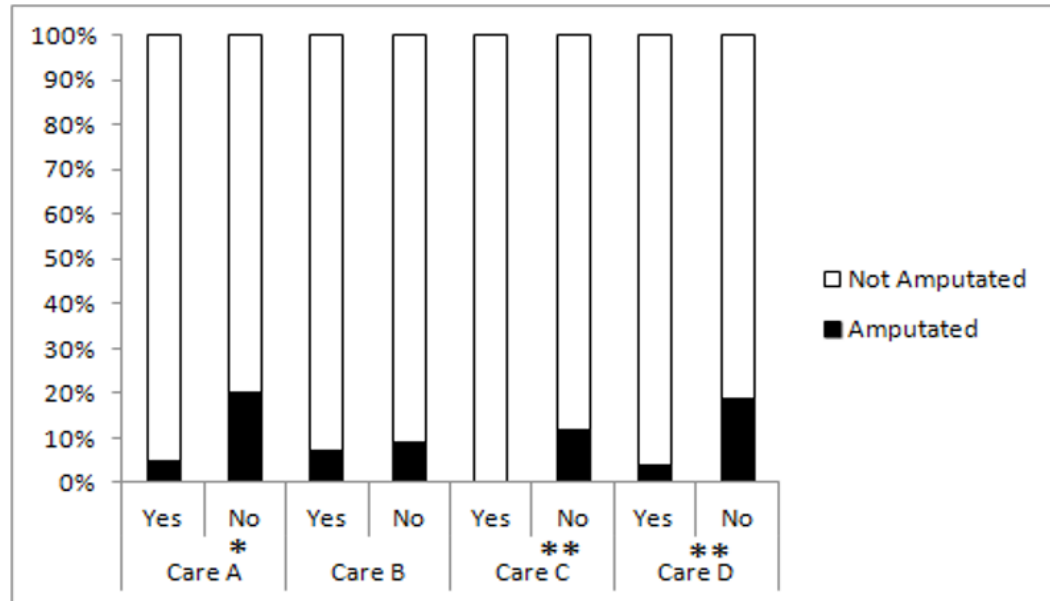

(A) to dry between their toes; (B) to know how to cut the feet nails; (C) to orientate the person in charge of nail-cutting; and (D) to check their shoes before use. Chi-squared Test for independents samples (* indicates $p<0.05$ and **$p<0.001$).

Table 3 - Differences in foot care actions between men (n = 26) and women (n = 45), Uruguaiana/RS, 2013

Questions	Men		Women		
	Yes (%)	N	Yes (%)	N	p value
Did you receive information about foot care?	65%	17	58%	26	0.1
Do you wipe moist areas between your toes?	69%	18	84%	38	0.1
Do you normally examine the plantar region of your feet?	46%	12	46%	21	0.9
Do you know how a person with diabetes should have their nails cut?	35%	09	40%	18	0.6
Do you advise the person who cuts your nails?	19%	05	33%	15	0.2
Do you check whether your shoes or socks leave marks on your feet?	35%	09	51%	23	0.1
Do you check your shoes before using them?	61%	16	75%	34	0.2
Presence of 1 or more feet injuries [a]	100%	26	71%	32	0.002*
Do you practice self-medication for the injuries?	46%	12	67%	30	0.09
Presence of amputations	19%	05	2%	01	0.01*

[a]By injuries we mean: ulcers, wounds, infection, swelling in the foot / ankle, change in temperature or color, fungal infections on nails, cracks in the skin, calluses, painful or sensitive areas. Chi-squared Test for independents samples (* indicates p values <0.05).

Figure 2 - Relation between schooling years of participants with the main strategies to blood glucose control (A) and schooling years and the number of foot injuries (B), Uruguaiana/RS, 2013
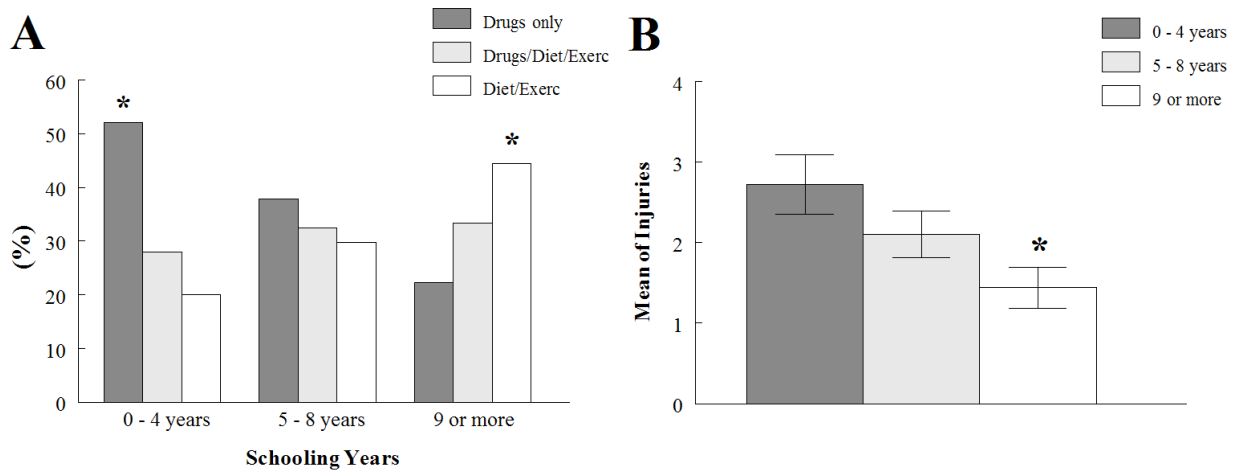
(A) Chi-squared Test for independents samples, * indicates statistically significant difference in each block of schooling.
(B) Chi-squared Test for independents samples, * indicates statistically significant difference in number of foot injuries.

that men receive more information about foot care than women. However, despite the fact that the implementation of care was not statistically different between genders, men had more injuries and amputations when compared with women. In view of these findings, some considerations may be put forward:

I) Although not statistically significant, there was a tendency among women to practice more self-care than men. This factor may have contributed to protect women from injuries and amputations. In fact, these data are reinforced by others that indicate that women are more active in self-care while men show a more passive attitude[14].

II) Blood Glucose, one of the risk factors for diabetic foot, was not assessed in our study. It is known that a poor glycemic control is closely related to diabetic foot development[15], and a study conducted in Brazil revealed that elderly men have worse glycemic control compared to women[16]. Thus, evaluation of blood glucose should be a factor to be evaluated in further studies.

III) Other factors, such as lifestyle (alcoholism, smoking) and hormonal differences may increase the chances of men to develop diabetic neuropathy (a major complication for diabetic foot). The "testosterone hypothesis" indicates that testosterone deficiency, common in men with diabetes,

leads to a more pronounced deficit of neurosteroids[17]. These neuroactive steroids maintain the function of Schwann cell and result in protection and regeneration of peripheral nerves affected by diabetic neuropathy[17].

Our study shows the importance of informing and involving DM patients in foot care practices in order to prevent or reduce the foot injuries and lower limb amputations. It is now well-established that foot injuries are directly related to increased number of amputations in DM subjects[10], which makes treatment costly and highly debilitating. Estimations suggest that amputations costs for diabetic patients is 5.54 times higher when compared to diabetic patients without amputation[18], thus reinforcing the assumption that subjects with DM should be encouraged to perform foot care practice in order to reduce the probability of complications[19]. In fact, education of patients about foot care has been found to be a key tool in stimulating self-care. However, uninformed or misinformed self-care has also been observed. We believe that such behavior could be due to not understanding how to perform the procedures or to patients' neglect. Furthermore, self-care may be affected by other factors, such as physical limitations, schooling levels, DM duration, gender and the high prevalence of depression in these subjects[20].

Ineffective foot care practice seems to be strongly related to the schooling level of the individuals. Higher DM prevalence

in individuals with low education and the association between low education and lower treatment adherence have been demonstrated[21] Notably, the impaired ability to understand DM pathophysiology and treatment may lead to misunderstandings and poor self-care. In this context, we observed that most of the participants had a low level of education. Moreover, we found an important relation between years of schooling and the number of foot injuries, since only the participants with fewer than eight years of schooling presented more than three foot injuries.

Indeed, the understanding of the received information is of great importance to successful foot care, and our results showed that foot care practice may be a protective factor against amputations in subjects with DM. These data are consistent with other studies that show the education about foot care along with the periodic feet examinations are effective to prevent ulceration and amputations[22,23]. It should be noted that the health education must involve the patient, his family, and also the health professionals engaged in the treatment[24,25]. Given the schooling level of some patients, health education should be carefully geared to close involvement in knowledge construction, maintaining regimens as simple as possible, negotiating priorities and monitoring adherence to effectively promote self-care and reduce the incidence of foot ulcer and amputation[26]. In this line, health education should be embedded in all the practices carried out in the context of public health. Thus, health education in subjects with diabetes should be a permanent commitment of the health professional. Committed health educators are able to promote behavior change of patients, making them protagonists in their own health situation.

CONCLUSION|

In conclusion, this study demonstrates that health education directed to care of diabetic foot should be a constant practice in health services. Additionally, health education should consider key factors such as gender and educational level of individuals, promoting effective self-care and preventing the onset of foot injuries.

Some limitations of the study need to be mentioned, namely: 1) The self-reported data that may be affected by selective memory (remembering or not remembering experiences or events that occurred at some point in the past); 2)

Predominance of the female gender in the population of this study (may have masked the data related to men).

Further longitudinal studies on education and monitoring of the diabetic patients should be undertaken to discuss knowledge construction and the practice of foot care. Also, more homogeneous samples could draw a more precise picture of the problem. However, despite the limitations, we believe that our study shed some light on the reality of health education targeted at people with DM, an area whose complications remain unfortunately overlooked.

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