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Original Research Article

Determining factors the knowledge of the element of diabetic foot prevention of patients followed at the endocrinology unit of Joseph Raseta Befelatanana hospital

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ABSTRACT

Background: Diabetic foot (DF) is a common and disabling complication of diabetes that requires effective prevention. Objectives of this study are to investigate the factors determining knowledge of preventive measures for diabetic feet.
Methods: We performed a analytical, single-center, cross-sectional study at the endocrinology unit of the Joseph Raseta Befelatanana university hospital between September 2023 and January 2024. One hundred patients were included. The ANOVA test was used for the comparison of means. Chi-square was used to measure the association between two qualitative variables. The significance level of $p<0.05$.
Results: The least known prevention elements by diabetics were: methods to remove horns (such as the use of sharp objects), those to remove nails as well as dangerous methods to warm the feet. The knowledge rates for these elements in the population were 7%, 47% and 45% respectively. Patients living in rural areas had less knowledge of podiatric prevention (p=0.03). Those with at least a "high school" level (95% CI=2.67 [1.14-6.21]; (p=0.02), diabetics with at least two dependent children (p=0.02), as well as those who followed regular treatment (p=0.03) had significantly better knowledge of these preventive measures for foot lesions.
Conclusions: This study encourages a strengthening of the education of diabetics in relation to these preventive measures for foot lesions. Especially in patients with these characteristics.

Keywords: Diabetes mellitus, Diabetic foot, Madagascar, Primary prevention

INTRODUCTION

Diabetic foot (DF) is a generic term that refers to any podiatric lesions in diabetics whose mechanism is based on arterial involvement of the limbs and/or peripheral neuropathy. An infection could be added to these two pathophysiological elements to aggravate the lesion already present.[1,2]

These complications significantly increase the risk of disability and mortality, the rates of which vary depending on the region and country.[2,3]

Patient knowledge has been shown to play a role in the prevention of podiatric lesions.[4,5]

This prompted us to conduct this study, the objective of which was to determine the factors associated with the

knowledge of DF prevention in the patients observed in our study site. The goals were to strengthen the education of diabetics with these factors with a view to reducing the incidence of these types of diabetes complications.

The hypothesis of our study was the fact that: cases of diabetes that have progressed less than 5 years and/or those living in rural areas have a lower knowledge of the measures taken against DF.

METHODS

The study was carried out at the endocrinology unit of the Joseph Raseta Befelatanana university hospital (JRB), which is the tertiary referral hospital center for the management of diabetic states and its complications in Madagascar.

This was an analytical, single-center, cross-sectional study that included all patients with type 2 diabetes known for at least 6 months prior to their observation. We excluded those who had not been able to refused to answer correctly, but also those who had 2 feet amputated. These patients were seen in consultation or hospitalization at the study site during the 18-month period from September 01, 2023 to January 31, 2024. Our sample was exhaustive. All patients who met our criteria were included. A pre-established data collection sheet was used for data collection. We studied several variables including sociodemographic data (age, gender, place of residence, marital status, number of children in care, level of education, occupation), characteristics of diabetes such as age, duration of diabetes, number of known complications, history of amputation, notion of hospitalization for cardiovascular complications of diabetes, glycated haemoglobin level, treatment, the knowledge or not of the concepts on the following 9 items: Knowledge of suitable types of footwear, knowledge of horn care, knowledge of nail removal tools, knowledge of nail cutting techniques, knowledge of foreign object checks before putting on shoes, knowledge of the imperativeness of the use of footwear, knowledge of the rhythm of washing and cleaning feet, knowledge of the importance of drying the feet before putting on the shoes and knowledge of the danger of using hot objects and water to warm cold feet.

An open-ended question was asked to patients in relation to each of these items to assign a score of 1 in the case of accuracy of the answer given. The sum of the figures assigned for each item was calculated for each patient and was analyzed between 2 or more groups of patients. Arbitrarily, we defined knowledge as good if the sum of the grades obtained was ≥ 6. We compared the average of these scores between 2 or more groups of patients using the ANOVA test. For the analysis of the association between 2 qualitative variables, we used the chi-2 test. The significance threshold was <0.05.

Participants were informed of the objectives of the study. The survey was carried out for each patient after informed consent, in respect of anonymity and after obtaining the approval of the department and the hospital managers.

A pre-established questionnaire pre-tested in French, then translated into Malagasy was used for data collection. This data was captured, processed and analyzed on Microsoft ® excel 2020 and IBM SPSS ® version 26.

RESULTS

One hundred patients were included. Their mean age was 58.48±11.25 years with an extreme ranging from 31 to 83 years. The most part of our study population (82%) was between 46 and 75 years old. A female predominance was observed with 64 women (64% of cases) and 36 men (36%) giving a sex ratio of 0.56. Fifty-one percent of them lived in urban areas. Seventy-four percent of them (n=74) were married (74%, n=74) (Table 1). Forty-six percent of our population had no children in charge (Table 1). The education level for most of the participants were "primary" (28%, n=28) and "secondary" (28%, n=28) degree (Table 1). In relation to their professional status, those with a professional activity represented only 39% of our population (n=39) (Table 1). The tertiary sector was the most represented (n=34). The patients' diabetes lasted an average of 7.93 ±6.83 years. Patients with diabetes that had progressed for less than 5 years accounted for 40% of cases (n=40). Fifty-eight percent of them (n=58) were on regular treatment (Table 1).

Only 21% (n=21) of patients had a history of hospitalization for degenerative complications of diabetes (Table 1). Five percent (n=5) had already experienced a lower limb amputated (Table 1). About glycemic control, seventy-three percent of patients (n=73) had poor glycemic control at the time of the study reflected by an HbA1c level greater than 7% (Table 1). In relation to the risk of podiatric injury, grade 0 and 1 were the most frequently represented with 61% (n=61) and (25%, n=25) respectively (Table 1). The general characteristics of the study population are represented in Table 1.

After washing care foot was the most common element of DF prevention among patients with a frequency of 97% (Table 2). Methods for removing horns were the least known (7%) (Table 2). Table 2 illustrates the proportion of knowledge patients responses for DF prevention.

Living in a rural area was associated with poor knowledge of DF prevention with an OR=0.40 (0.17-0.91) and a p-value=0.03 (Table 3). The "high school" level influenced positively knowledge of the prevention of podiatric lesions (Table 3).

The analysis of factors associated with knowledge of the elements of DF (Table 3).

Patients with 2 or more children as well as those who followed their antidiabetic treatment on a regular basis had

a significantly higher level of knowledge of DF prevention than other patients. Their p=0.02 and 0.03 respectively (Table 4).

Diabetics previously known for less than 5 years had a lower level of knowledge compared to other patients. But this was not significant (p=0.31) (Table 4). The comparison of the means of the patient's level of knowledge is illustrated in Table 4.

Table 1: General characteristics of the study population, (n=100).

Demographic parameters	Frequency (%)
Gender	
Male	36
Female	64
Age (in years)	
<25	0
25-35	4
36-45	8
46-55	26
56-65	36
66-75	20
> 75	6
Marital status	
In wedlock	74
Without marital union	26
Number of children	
0	46
1	27
2	17
≥3	10
Place of residence	
Urban	51
Rural	49
Study level	
Primary	28
Secondary	28
High school	22
University	22
Professional status	
No profession	61
Working	39
Diabetes information	
History	
Previous hospitalization for CVS complications of diabetes	21
Previous amputation	5
Age of diabetes (in years)	
<5	40
5-9	37
10-15	12
>15	11
Patients on regular diabetes treatment	58
Current diabetes inbalance (HbA1C>7%)	73
Podiatric risk	
Grade 0	61
Grade 1	25
Grade 2	5
Grade 3	9

Table 2: Frequency of good knowledge of each diabetic foot prevention element, (n=100).

Elements of knowledge assessed	Frequency of patients with good knowledge (%)
Suitable footwear	66
Horn removal methods	7
Nail care equipment	96
Nail cutting methods	47
Checking shoes before putting them on	85
Drying and mycosis prevention	85
Care after washing	97
Risk walking barefoot	55
Unsuitable reheating methods feet	45

Table 3: Factors associated with knowledge of preventive measures against diabetic foot, (n=100).

Demographic parameters	Knowledge		OR [IC 95%]	P value
	Wrong	Good		
Gender				
Male	16	20	1.33 [0.58-3.05]	0.49
Female	24	40		
Residence				
Urban	15	36	0.40 [0.17-0.91]	0.03
Rural	25	24		
Marital status				
In wedlock	11	15	1.14 [0.46-2.82]	0.78
Without marital union	29	45		
Study level				
<High school	28	28	2.67 [1.14-6.21]	0.02
≥High school	12	32		
Professional situation				
No profession	23	38	0.78 [0.35-1.77]	0.56
In progress professional	17	22		
Other	26	40		
Previous hospitalization for cardiovascular complications of diabetes				
No	33	46	1.43 [0.52-3.94]	0.48
Yes	7	14		
Previous amputation				
No	39	56	2.79 [0.30-25.88]	0.35
Yes	1	4		
Current diabetes imbalance				
No	10	17	0.84 [0.34-2.09]	0.71
Yes	30	43		

Table 4: Comparison of mean scores for knowledge of DF prevention, (n=100).

Variables	Average score /9±SD	P value
Number of children		
<2	5.55±0.13	0.02
≥2	6.16±0.12	
Diabetes information		
Diabetes duration (in years)		
<5	5.53±1.18	0.31
5-10	6.06±1.48	
10-15	6.00±1.28	
≥15	6.00±1.25	
Antidiabetic treatment		
Non regular	5.50±1.25	0.03
Regular	6.05±1.25	
Type of treatment		
Injectable	5.92±1.32	0.89

Continued.

Variables	Average score /9±SD	P value
Oral agents	5.79±1.25	
Both injectable and oral agents	5.77±1.36	
Podiatric risk grade		
Grade 0	5.92±1.28	0.78
Grade 1	5.60±1.32	
Grade 2	5.80±1.79	
Grade 3	5.78±0.83	

DISCUSSION

Methods for removing horns, appropriate methods for warming the feet, and methods for trimming nails were the least known elements of DF prevention by patients (Table 2). Traoré et al reported in 2015 that 59.1% of patients interviewed in Mali were unaware of foot maintenance and hygiene.[6] Houmkoua et al found that 77.6% of patients used a razor blade to trim their nails.[7] A Malagasy study conducted by Raharinavalona et al in 2017 found that 43.5% of patients were unaware of the risk of diabetic patients and 54% had no precise answer on the maintenance and conduct to be followed in relation to the feet.[8] What is known may differ from one population with diabetes to another. This underlines the importance of educating diabetics about these different elements, with particular emphasis on the care of the horns and nails as well as the appropriate techniques.

Regarding the socio-demographic parameters of patients, living in a rural area was associated with a poor knowledge of the prevention of podiatric lesions (Table 3). In Ethiopia, Tuha et al also found this influence of residential environments in the knowledge on the prevention of foot lesions, to the detriment of patients living in rural areas ($p<0.05$).[9] This could be explained by the less accessibility of information and education on care. We found that patients who had completed at least the high school level had better knowledge (Table 3). The study carried out by Bouffard did not share this same observation, but it did find the influence of patient training in podiatric prevention ($p<0.05$).[10] Similarly, Muhammad-Lufti et al. did not find this influence of the level of study in the knowledge of podiatric preventions.[11] This difference could be due to the diversity of school curricula as well as the difficulties of accessibility to information. The high level of knowledge among better-educated patients is explained by their better ability to access and understand medical information. Education could thus play a crucial role in preventing diabetes-related complications, enabling patients to adopt proactive behaviours to protect their feet. It would therefore be essential to develop educational programmes adapted to all levels of education and all living areas to reduce the risk of foot injuries. We have found that patients with 2 or more children had a better knowledge of podiatric prevention. Parents may be more motivated to learn about health care and preventive practices, not only for themselves but also for the well-being of their children. According to a study by Croquison et al parental involvement in their child's care gives them a sense of control and encourages them to get involved and motivated to learn about care.[12]

Neither the history of previous hospitalization for cardiovascular complications of diabetes, nor the history of amputation were associated with less or better knowledge of podiatric prevention.

Diabetics did not show a significant difference in their level of knowledge according to the duration of their diabetes (Table 4). Rachdi et al also stated the absence of a link between these two parameters in their study.[13] The education of diabetics in relation to the feet should not then target patients according to this seniority of diabetes. It should be of interest to all patients in a global way.

In contrast, patients who followed their treatment on a regular basis had significantly better knowledge (Table 4). Haoues et al also reported this association between the regularity of treatment and follow-up with a better knowledge of diabetes, including podiatric prevention.[14] This is quite normal because the follow-up opts for regular and appropriate treatment but also encourages and educates patients to adopt good behaviors to limit diabetes-related morbidities.

Our study was limited by the difficulty of interpreting the associations found, since it is a cross-sectional study.

CONCLUSION

DF is a disabling complication that generates additional costs for diabetes treatment. This would put patients living in resource-limited countries such as Madagascar in a multifactorial therapeutic difficulty that can rapidly change the functional and vital prognosis. Hence the importance of identifying the determinants of the level and the state of knowledge of the elements of prevention of diabetic feet. Rural residence, low educational attainment, inconsistent treatment, and the number of children under 2 were associated with low knowledge. At the end of this study, diabetics who have one or more of these characteristics should then benefit from a reinforcement of education focused on the prevention of DF. Improving access to information, education and communication is also essential.

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