Original Research Article

Assessment of the knowledge of a diabetic patient population on the health of their feet

ABSTRACT

Aims: To assess the knowledge of diabetic patients and research the factors associated with good knowledge, while providing podiatric advice.

Study design: Original research papers.

Place and Duration of Study: Department C (National Institute of Nutrition of Tunis), September 2019.

Methodology: We included 100 diabetic patients (44 men, 5 women; age range 29-87 years). They had an evaluation of their knowledge on the diabetic foot, by means of a pre-established questionnaire as well as a metabolic evaluation.

Results: The mean age was 54 ± 12.9 years, The sex ratio was 0.78. 56% had a secondary or higher education level. Active smoking was 35% common. Diabetes was type 2 in the majority of cases (78%). The average duration of progression of diabetes was 13.62 ± 6.29 years. 78% of the population has been unbalanced. 34% of the population had good knowledge of preventive measures for diabetic foot. Having good knowledge of preventive measures was significantly associated with secondary or higher education ($p = 0.005$), female gender ($p = 0.026$) and glycemic control ($p = 0.043$).

Conclusion: Larger studies are essential in order to have Tunisian epidemiological references on the diabetic foot, and to identify the factors associated with poor podiatric knowledge and podiatric practices, as well as the factors which slow down adherence to preventive measures recommended. An educational program focused on the diabetic foot is therefore essential to effectively oppose this scourge.

1*. INTRODUCTION :*

Diabetes is a public health problem worldwide and in Tunisia. The international diabetes federation estimates that 425 million people are diabetic in 2017. By 2045, this figure will reach 629 million diabetics [1]. In Tunisia, the recent study "Tunisian Health Survey" estimates the prevalence of diabetes in 2016 at 16%. This high prevalence of diabetes is associated with the increase in the prevalence of unbalanced and complicated diabetes. The diabetic foot is among the most alarming complications. The prevalence of this entity varies from 3 to 13% depending on the continent [3]. We conducted this study to assess the knowledge of diabetic patients and seek the factors associated with good knowledge, while providing podiatry advice.

2. MATERIAL AND METHODS :

2.1-Description of the study:
This is a prospective cross-sectional descriptive study, involving 100 diabetic patients, followed up in the department C of the National Nutrition Institute of Tunis (INNTA), recruited during the month of September 2019.

2.2-Study protocol:

We included in our study diabetic patients over the age of 18, whose diabetes had been diagnosed for more than 1 year and who agreed to participate in our study. We did not include patients with pathologies that did not allow them to answer our questionnaire (psychopathies, deafness, etc.). No patient was excluded from the study.
The recruitment of patients was done at random from the external consultations of service C of INNTA.

A file has been pre-established to record the clinical and biological data of the patients.
Patients were given oral consent to participate in the study after explaining the objectives. The interview followed the usual consultation, in a separate office. It was done by the same educator. It lasted at least 30 minutes for each patient.

During the consultation, we collected the socio-demographic characteristics of the population (age, gender, level of education, addictions, tobacco, alcohol), the characteristics of diabetes (type, duration of evolution, glycemic control, treatment, degenerative complications, cardio-metabolic comorbidities associated with diabetes). The evaluation of patients' knowledge of the health of their feet was done by closed-ended questions on:

 -The mechanisms and factors involved in the development of the diabetic foot (6 closed questions).
 -Clinical manifestations of the diabetic foot (10 closed questions).
 - The evolutionary risks of a neglected diabetic foot (4 closed questions).
 -The preventive measures to follow to avoid the appearance of the diabetic foot (15 closed questions).
Balanced diabetes was defined with reference to the recommendations of the American Diabetes Association of 2019 (ADA 2019) [2] was defined by an HbA1C ≤7%. The glycemic target has been widened to 8% in patients:

-Having recurrent severe hypoglycaemia.
- Having an advanced degenerative complication (chronic renal failure , ischemic heart disease).
-Having a limited life expectancy (age≥80 years).

Knowledge about diabetic foot preventive measures has been considered:
-Insufficient: if the patient knows less than 5 preventive measures (<5).
- Medium: if the patient knows 5 to 10 preventive measures (5 to 10).
-Good: if the patient knows more than 10 preventive measures. (> 10).

At the end of each patient's assessment, we have:
-Correct patients' false beliefs.
-Explain in a simplified way, the main pathophysiological mechanisms involved in the appearance of the diabetic foot.
-List the main clinical manifestations of the diabetic foot.
-List the evolutionary complications of neglected diabetic foot.
-Provide podiatry advice to avoid the appearance of diabetic foot.

An educational sheet, where the advice was written in native language (Arabic), was given to the patients at the end of the meeting.

2.3- Statistical analysis:

 Data were analyzed using SPSS version 19.0 software. Simple frequencies were calculated for the qualitative variables, means, medians and standard deviations and the extreme values for the quantitative variables.
Percentage comparisons on independent series were carried out by the Pearson Chi-square test, and in the event of significance in the Chi-square test and the invalidity of this test and comparison of 2 percentages, by the bilateral test of Fisher. The materiality threshold was set at 0.05. The mutivariate analysis was done by multinomial logistic regression.

3. RESULTS:
3-1-Characteristics of the population:
3-1-1-General characteristics of the population:
The sample studied consisted of 44% men and 56% women (sex ration =0.78). The mean age was 54 ± 12.9 years with extremes of 29 and 87 years. 27% (n = 27) were over 65 years of age. 56% had a secondary or higher education level. 37% were smoking. 3% were ethyl. Overweight and obesity were the main comorbidity associated with diabetes in our population with a frequency of 70%, followed by high blood pressure (44%) and dyslipidemia (38%).
3-1-2- Characteristics of diabetes:
Diabetes was type 2 in the majority of cases (78%). The average duration of diabetes was 13.62 ± 6.29 years, with extremes of 2 and 32 years. It had evolved for more than 15 years in 43% of the cases. The majority (69%) of the patients were on insulin therapy. The rest were treated by oral anti diabetics.
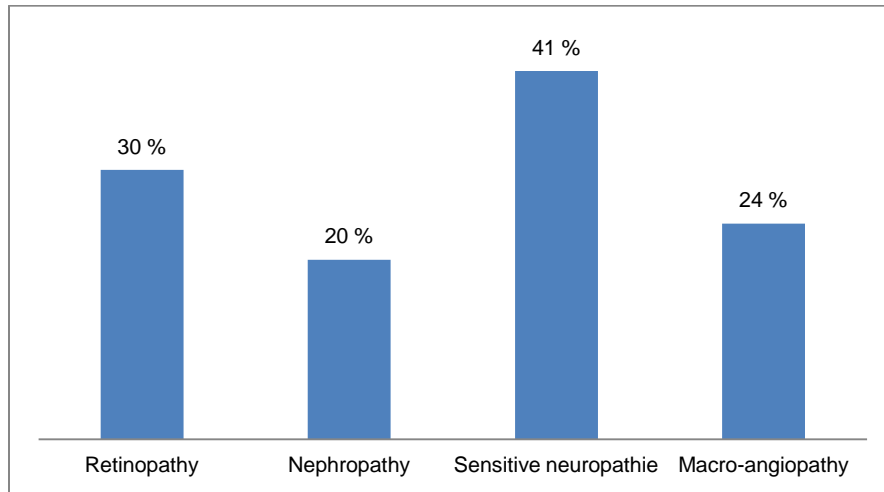.

Figure 1: Degeneratives complications of the population

3-1-3- Clinical and biological characteristics:

The average weight was 74.62 ± 12.65 kg. The average high was 1.62 ± 0.05 m. The average body mass index was 28.36 ± 5.6 kg / m² with extremes of 19.36 and 43.7 kg / m². The average HbA1C was 9.47 ± 2.32% with extremes of 5.3 and 14.9%. 78% of the population has unbalanced diabetes.

3-2-Assessment of the population's knowledge of diabetic foot:

62% said they had received podiatric education during the follow-up of their diabetes.

3-2-1-Assessment of patient knowledge:

a- Assessment of knowledge on the mechanisms and factors involved in the onset of diabetic foot:

Table 1: Assessment of knowledge on the mechanisms and factors involved in the onset of diabetic foot

Mecanisms et factors	Frequences (%)
No knowledge	7
Arteriopathy	26
Neuropathy	26
Traumatism	78
Unsuitable footwear	60
Infection	57
Multifactorial origin	52

b- Assessment of knowledge on the clinical manifestations of diabetic foot:

Table 2: Assessment of knowledge on the clinical manifestations of diabetic foot:

clinical manifestations	Frequences (%)

Deformations	43
hyperkeratosis	35
Horns and calluses	23
Neuropathy	43
Intermittent claudication	32
Other skin abnormalities (Hyperpigmentation, depilation, thin and cold skin)	0
Injury	46
Infections	48
Gangrene	82
No knowledge	10

c- Knowledge of the main evolutionary risks of neglected diabetic foot:

Table 3: Knowledge of the main evolutionary risks of neglected diabetic foot:

Risks	Frequences (%)
Amputation	92
Septicemia	47
Death	26
No knowledge	0

d- Knowledge of diabetic foot prevention measures:

Table 4: Knowledge of diabetic foot prevention measures:

Prevention measures	Frequences (%)

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Banlancing diabetes	*82*
Examine feet daily	*35*
Wash feet daily with checked warm water and dry well	*78*
Change socks every day	*44*
Use a foot moisturizer	*5*
File the nails with a cardboard file instead of cutting them	*26*
Avoid handling corns and calluses by sharp instruments	*51*
Avoid walking barefoot	*61*
Put hands in the shoes before putting them on	*6*
Buy the shoes at the end of the day	*35*
Prefer shoes a little larger than the size	*39*
Limit heels to 5 cm	*38*
Avoid the use of hot water bottles and bring the feet closer to the heating devices	*34*
Never neglect a lesion on the feet	*55*
Prohibition of the application of colored products on lesions of the feet and products that dry the feet (Henna)	*6*
No knowledge	*10*
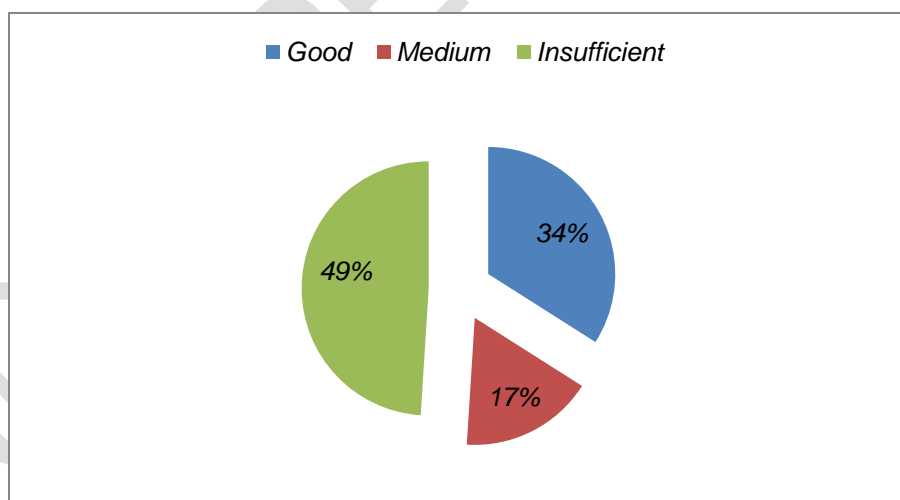
Figure 2: Distribution of the population according the knowledge of preventive measures of the diabetic foot

3-2-2- Associated factors with good knowledge of diabetic foot preventive measures:

In univariate analysis, we studied the association of good knowledge of preventive measures of diabetic foot with: gender, age (<65 years old versus ≥65 years old), level of education (higher and secondary versus primary and illiteracy) , family history of diabetes,

duration of diabetes (<15 years and ≥15 years), glycemic balance (balanced versus unbalanced) and the presence of at least one other degenerative complication of diabetes.

Table 5: Factors associated with good knowledge of preventive measures in univariate analysis:

	Good knowledge of preventive measures (n=34)	Medium/ insufficient knowledge of preventive measures (n=66)	P value	OR[IC 95%]
Women (n=56)	48.2% (n=27)	51.8% (n=29)	.001	4.9[1.8;12.8]
Men (n=44)	15.9% (n=7)	84.1% (n=37)		
Age<65 years (n=73)	41.1% (n=30)	58.9% (n=43)	.017	[1.2; 12.7]
Age≥65 years (n=27)	14.8% (n=4)	85.2% (n=23)		
Secondary or higher level of education (n=56)	53.6% (n=30)	46.4% (n=26)	<0.001	11.5 [3.6;36.5]
Primary and illiteracy (n=44)	9.1% (n=4)	90.9% (n=40)		
Family history of diabetes (n=53)	37.7 % (n=20)	62.3% (n=33)	.52	-
No family history of diabetes (n=47)	29.8% (n=14)	70.2% (n=33)		
Diabetes duration <15 years (n=43)	27.9% (n=12)	72.1% (n=31)	.29	-
Diabetes duration ≥15 years (n=57)	38.6% (n=22)	61.4% (n=35)		
Balanced diabetes (n=22)	72.7% (n=16)	27.3% (n=6)	<0.001	8.8[3;26]
Unbalanced diabetes (n=78)	23.1% (n=18)	76.9% (n=60)		
≥ 1 degenerative complication of diabetes (n=62)	30.6% (n=19)	69.4% (n=43)	.39	-
No degenerative complication of diabetes (n=38)	39.5% (15)	60.5% (n=23)		

In multivariate analysis, the factors associated with good knowledge of preventive measures were the level of secondary or higher education (p = .005,OR [IC 95%]= 6 [1.7; 21.4]), the female gender (p = .026, OR [IC 95%]= 3.4 [1.1; 10]) and glycemic balance (.043, OR [IC 95%]= 3,4 [1; 11.4]. The age below 65 was not significantly associated with having good knowledge of preventive measures for diabetic foot (p = 0.33, OR [IC 95%]= 1.9 [0.5; 7.5]).

4-discussion:

Most of our results agree with those shown in a Moroccan series published by Imame Y in 2015, having prospectively collected 155 diabetics, with the aim of assessing their knowledge on the diabetic foot. 8.3% of patients had no knowledge of the clinical manifestations of the diabetic foot, 48% of the patients mentioned the wound as the first clinical manifestation of the diabetic foot, followed by necrosis (41%) and plantar perforation (17%). In terms of prevention, 31% of patients do not know any measures of preventing diabetic foot. Daily foot washing was the most frequently cited measures of prevention (36%) [4]. Similarly in Turkia, the knowledge assessment of 1030 diabetics showed that only 20.8% had good practices. Neither age, gender, history of infection or amputation in the lower limbs was significantly associated with a good level of knowledge. The hight level of education, living in the city, high income, type 1 diabetes and old diabetes have been significantly associated with good practices [5]. In the study of Abdulghani HM et al, conducted with 360 type 2 diabetics, almost 70% of the patients had good knowledge on preventive foot care. However, only 41.7% of patients still examine their feet, 41.4% wash their feet, 31.4% dry thoroughly between the toes, and 33.1% used a foot moisturizer [6]. In Sudan, Abdullah SA et al assessed the knowledge of 150 diabetics on foot care. Knowledge of foot hygiene measures was good, moderate and poor in 46.7, 24 and 29.3% of cases, respectively. The authors of this study recommended, in view of the results they showed, to intensify the podiatric education of diabetics. Measures taken by patients to prevent diabetic foot were reported in 42.6% of cases. Good practices and knowledge were significantly associated with age over 51 years and a good level of education [7]. In Malaysia, Muhammad-Lutfi AR showed that 58% of 157 diabetics had little knowledge of foot care, and that 61.8% had poor foot care practice [8]. Similarly, in India, where the prevalence of diabetes is among the highest, Kishore S showed that 12.5% (n = 50) among 400 diabetics had, during the follow-up of the disease, advice on the preventive measures for diabetic feet. Almost 25% had received no education. The assessment of the quality of foot care, which was done using a score proposed by the American Diabetes Association, as part of the educational program, did not exceed 5 out of 15 and a was rated as insufficient. The results were significantly associated with age, education, duration of diabetes, family history of diabetes, glycemic control, and previous education in diabetes complications, in particular the diabetic foot [9].

Other studies showed that patients' knowledge is better. In China, Magbanuya R showed, in a population of 330 diabetics, that 82.7% had a good knowledge of foot care, 22.4% had good personal care practices for the feet and 71% had a good practice score . Diabetes education patients were twice as likely to have a good knowledge score (p = 0.03; OR = 2.41, 95% CI [1.09; 5.32]). Patients with diabetes for more than ten years and those with a family history of diabetes were 50% less likely to have a score of good practice (p = 0.021, OR 0.50, 95% CI [0.28; 0 , 90] - p = 0.008, OR 0.49, 95% CI [0.29 to 0.83], respectively) [10]. In Saudi Arabia, Alshammari ZJ collected 368 diabetics to analyze their knowledge, attitudes and foot care practices. 76.6% had a good knowledge of diabetic feet and foot ulcers. 11.1% participated in an educational session on the diabetic foot. 22% were educated by doctors and 10.3% by nurses. Being married, having a secondary or university education, being employed, having diabetes for more than 5 years, were the factors associated with better knowledge [11]. In Bangladesh, Lamchahab FZ showed that more than 50% of the population studied had little knowledge of the diabetic foot, and that the level of knowledge was associated with age, education levels, socioeconomic level [12]. Similarly, in Germany, Schmidt S studied 269 diabetics. He showed that the knowledge of patients who participated in more than 3 educational sessions was better in comparison with patients who had no education. The patients most at risk of foot ulcers had more adequate care except for shoes [13].

Thus, the results of different studies that have assessed the knowledge of diabetics are very variable. However, there were many limits. The small size of the samples studied, which are not representative of the general population, is the most common weakness in most of these studies. On the other hand, having good knowledge does not reflect the real practices of patients, which is the result of many factors. Several studies have been interested in this aspect; For example, in India, Chellan G et al compared knowledge, attitudes and practices, using a validated questionnaire, of two groups of diabetics with or without plantar perforation. Knowledge and attitudes were significantly better in patients with plantar perforating pain, with frequencies of 57.3 (40%, p = 0.001) and 94.2% (88%, p = 0.15, respectively).). The practices were better in those without a plantar perforating pain with a frequency of good practice of 36% (16.7%, p = 0.001) [14]. Similarly, in a study published in 2008 by Oslan JM et al, conducted with 717 diabetics of African-American, Asian, Hispanic and Indian origin, the measures of foot hygiene were better among Asians. The obstacles to good practices were paradoxically more reported by them (reduced visual acuity (p = 0.13), difficulty reaching the feet (p = 0.76), poor socio-economic conditions (p < 0.01) and good knowledge without knowing how to practice it (p <0.01)). The authors also described the hygiene measures of patients who had good theoretical knowledge. They showed that 55% of African Americans and 33% of Hispanics have never checked their feet (p = 0.4), 56% of Hispanics are used to walking barefoot and 60% of American Indians never checked the water temperature. Thus, this study reveals the significant gap between good knowledge in diabetics and the hygiene measures practiced with clear inter-ethnic variability very probably of cultural origin [15]. On the other hand, the quality of the overall care of diabetics before inclusion is nonetheless a plausible hypothesis explaining the variability of the results between studies. As an example, in the study carried out in Saudi Arabia by Alshammari ZJ [11]. The number of annual consultations in diabetology in the department where the study took place was a minimum of 1 to 5 consultations for 84.2%. Such a result connotes a diabetological care that can be considered optimal particularly in terms of therapeutic education.

The low socio-economic level has also been described as a factor associated with poor knowledge of diabetes and its complications [16]. The literature also reports that poor knowledge is more common in the elderly, illiterate, low income, and those with other chronic conditions such as high blood pressure [17].

4. CONCLUSION:

In the light of these results and data from the literature, the challenge of any health professional is the effectiveness of the motivational interview with his patient in order to make him acquire good preventive measures to which he should adhere. A good doctor-patient relationship is essential to achieve this goal.

Finally, larger-scale studies are essential in order to have Tunisian epidemiological references on this entity, and to identify the factors associated with poor knowledge of diabetics as well as the factors that decrease patients' adherence to the recommended preventive measures. All these elements must be taken into account when setting up a national podiatry education program for diabetics, which must imperatively involve several stakeholders to effectively oppose this burden.
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CONSENT (WHERE EVER APPLICABLE)

Oral consent was obtained from the patients.

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