RISK FACTORS ASSOCIATED WITH DIABETIC FOOT IN THE PNP LUIS N. SAENZ HOSPITAL, 2017

FACTORES DE RIESGO ASOCIADOS A PIE DIABÉTICO EN EL HOSPITAL PNP LUIS N. SAENZ, AÑO 2017

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ABSTRACT

Introduction: Diabetic foot is one of the most serious and frequent complications of diabetes mellitus, for this reason it is important to know the risk factors that trigger it. **Objective:** To determine the risk factors associated with diabetic foot in the PNP Luis N. Sáenz Hospital, 2017. **Methods:** Observational, quantitative, retrospective, analytical, case-control study. The study population consisted of 165 patients (55 cases and 110 controls) seen in the endocrinology division in 2017. Risk factors, modifiable and non-modifiable associated with the development of diabetic foot were studied. The information of the clinical histories was collected through a data collection form. This data was analyzed by means of the SPSS program version 25.0 using the statistical models of Chi-square and the odds ratios with a level of significance less than 0.05%, and a range of 95% confidence. **Results:** The risk factors associated with diabetic foot are related to the time of diagnosis (p:0.000; OR: 12.77; IC: 4.12 - 39.60), wrongly controlled glycosylated hemoglobin (p: 0.029; OR: 4.55; IC:1.17 - 17.68), onychomycosis (p: 0.014; OR: 7.10; IC: 1.48 - 34.07); history of smoking (p: 0.031; OR: 2.66; IC: 1.09- 6.34) and chronic kidney disease (p: 0.047, OR: 3.023, CI: 1.01 - 9.0). **Conclusion:** It is concluded that there is a significant statistical association between developing diabetic foot with the time of illness, poorly controlled glycosylated hemoglobin, onychomycosis, chronic kidney disease, and smoking history.

Key words: Foot diabetic; Factors of risk do not modifiable; Factors of risk modifiable. (source: MeSH NLM)

RESUMEN

Introducción: El pie diabético es una de las complicaciones más graves y frecuentes de la diabetes mellitus, por tal motivo es importante conocer los factores de riesgo que lo desencadenan. **Objetivo:** Determinar los factores de riesgo asociados a pie diabético en el hospital PNP Luis N. Sáenz, año 2017. **Métodos:** Estudio observacional, cuantitativo, retrospectivo, analítico, de casos y controles. La muestra la conformó 165 pacientes (55 casos y 110 controles) atendidos en el servicio de endocrinología en el año 2017. Se estudiaron factores de riesgo, modificables y no modificables, asociados al desarrollo de pie diabético; se recogió la información de las historias clínicas mediante una ficha de recolección de datos, la cual fue analizada mediante el programa SPSS versión 25.0 utilizando los modelos estadísticos de Chi cuadrado y el odds ratios con un nivel de significancia menor a 0.05% y un intervalo de confianza de 95%. **Resultados:** Los factores de riesgo asociados a pie diabético son tiempo de enfermedad (p: 0,000; OR: 12.77; IC: 4.12 – 39.60), hemoglobina glicosilada mal controlada (p: 0.029; OR: 4.55; IC: 1.17 – 17.68), onicomicosis (p: 0.014; OR: 7.10; IC: 1.48 – 34.07); antecedente de tabaquismo (p: 0.031; OR: 2.66; IC: 1.09 – 6.34) y enfermedad renal crónica (p: 0.047; OR: 3.023; IC: 1.01 – 9.0). **Conclusión:** Se concluye que hay asociación estadística significativa entre tiempo de enfermedad, hemoglobina glicosilada mal controlada, onicomicosis, enfermedad renal crónica y antecedente de tabaquismo, con desarrollar pie diabético.

Palabras clave: Pie diabético; Factores de riesgo no modificables; Factores de riesgo modificables. (fuente: DeCS BIREME)

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INTRODUCTION

The World Health Organization (WHO) in 2016 reported that, the adult population with diabetes mellitus in 2014 amounted to 422 million in the world. According to Demographic and Family Health Survey 2016 (ENDES), type 2 diabetes mellitus is a public health problem at the national level. It is an issue due to its prevalence (3.2%), the high cost of treatment, and management of complications[1,2]. Diabetic foot adds long hospital stays in contrast to any other complication of type 2 diabetes mellitus, with significant morbidity and mortality[3].

The factors associated with diabetic foot are divided into two large groups which are non-modifiable, and modifiable. In this study the non-modifiable risk factors were analyzed: sex, age, and time of evolution of the disease greater than ten years. The modifiable factors such as glycosylated hemoglobin greater than 7.5%, history of smoking, onychomycosis, obesity, overweight, peripheral vascular disease, peripheral neuropathy, the presence of arterial hypertension, chronic kidney disease and dyslipidemia.

Diabetic foot, undoubtedly today, represents one of the most serious and frequent complications of diabetes mellitus 2. For this reason, it is important to determine the risk factors associated with diabetic foot in the PNP Luis N. Sáenz Hospital during the year 2017.

METHODS

Type and design of research

The research design of this study is observational, quantitative, retrospective, analytical type, of cases and controls. It was developed in the context of the IV COURSE - WORKSHOP OF GRADUATION BY THESIS according to the published and methodology approach[4].

Population and sample

Population and study sample included patients diagnosed with diabetes mellitus type 2 treated in the endocrinology division of the PNP Luis N. Sáenz Hospital during the months of January to December in 2017. The sample consisted of 165 patients: 55 cases diagnosed with diabetes mellitus type 2 as well as diabetic foot, and 110 controls with a diagnosis of diabetes mellitus type 2 without diabetic foot were the controls, with a ratio of 1: 2.
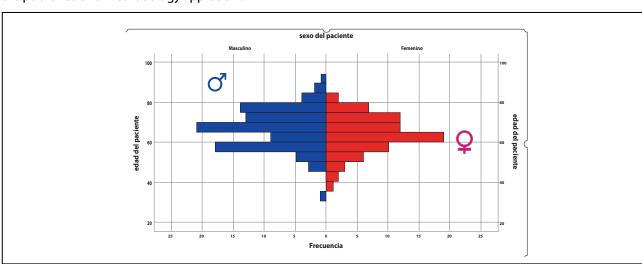
Data processing and analysis technique.

The "IMIN" calculator was used (IV COURSE - WORKSHOP OF GRADUATION BY THESIS). Based on the bibliography review it was considered, an incidence of 9.8%, an odds ratio of 3.8, a level of statistical significance of less than 0.05%, and a range of 95% confidence.

The information was obtained from the medical records of the patient and recorded in a data collection sheet. The program IBM SPSS Statistics 25.0 was used to process them. Descriptive statistics, bivariate analysis (Chi-square and Odds ratio), and logistic regression of the variables of interest were performed.

RESULTS

The following variables were evaluated: sex, old age (over 60 years), body mass index (overweight, obesity), disease time over ten years, poor control (glycosylated hemoglobin > 7.5%), peripheral vascular disease, peripheral neuropathy, smoking history, onychomycosis, and comorbidities (arterial hypertension, chronic kidney disease, dyslipidemia).

Source: Clinical Histories Luis N. Sáenz Police Hospital.

Graphic 1. Pyramid age/sex of patients treated in the division of endocrinology of the Hospital of Police, January-December 2017.

Regarding the age of the patients according to age groups, the predominant group is the older adult (> = 60 years old) with 116 patients (70.3%), the other age group<60 years was made up of 49 patients (29.7%).In both sexes, the ages fluctuated between 60 and 80 years old and it was the male patients who had extreme ages.

The minimum age was 32 years and the maximum age was 93 years. An average of 65.02 years was obtained, a mode of 69 years, and a median of 65 years. Regarding the sex variable, it was found the predominance of the masculine sex 91 (55.2%), in comparison to the feminine sex 74 (44.8%). Graphic 1

Table 1. Distribution of the index of corporal weight.

IMC		FREQUENCY	PERCENTAGE
Malnutrition	>18.5	3	1.8%
Normal weight	18.5-24.9	26	15.8%
Overweight	25- 29.9	92	55.8%
Type I obesity	30-34.9	39	23.6%
Type II obesity	35-39.9	4	2.4%
Type III obesity	>40	1	0.6%

In the body mass index category, we found that of all patients, 131 (79.4%) had overweight and obesity type I, 92 patients with BMI between 25- 29.9 and 39 patients with BMI between 30-34.9, respectively. (Table1).

Table 2. Association between non-modifiable risk factors and diabetic foot.

VARIABLE		DIABETIC FOOT	DO NOT PIEDIABETE	P VALUE	IC 95%	OR
Sex	Male	29 (31.9%)	62 (68.1%)	0.65	0.45 - 1.65	0.86
	Female	26 (35.1%)	48 (64.9%)			
Age	>60 years	42 (76.4%)	74 (67.3%)	0.22	0.30 - 1.33	0.63
	<60 years	13 (23.6%)	36 (32.7%)			
	Total	55 (100%)	110 (100%)			
Sickness time	> 10 years	39 (70.9%)	57 (51.8%)	0.019	1.13 - 4.52	2.26

Of the non-modifiable risk factors, the disease with greater time than 10 years has 2.26 times more risk of developing diabetic foot, the association is statistically significant (p: 0.019, OR: 2.26, CI: 1.13- 4.52).nt (p: 0.019, OR: 2.26, CI: 1.13- 4.52).

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Table 3. Association between modifiable risk factors and diabetic foot.

VARIABLE		DIABETIC-FOOT	DO NOT PIEDIABETE	P VALUE	IC 95%	OR
Glycosylated hemoglobin	Bad control	52 (94.5%)	81 (73.6%)	0.001	1.79 - 21.41	6.2
	Good control	3 (5.5%)	29 (26.4%)			
	Total	55 (100%)	110 (100%)			
Onychomycosis	Present	52 (94.5%)	86 (78.2%)	0.007	1.38 - 16.86	4.83
	Absent	3 (5.5%)	24 (21.8%)			
	Total	55 (100%)	110 (100%)			
Peripheral vascular disease	Present	31 (56.4%)	37 (33.65)	0.005	1.31 - 4.94	2.54
	Absent	24 (43.65)	73 (66.4%)			
	Total	55 (100%)	110 (100%)			
Peripheral neuropathy	Present	38 (69.15)	48 (43.6%)	0.002	1.45 - 5.72	2.88
	Absent	17 (30.9%)	62 (56.4%)			
	Total	55 (100%)	110 (100%)			
Smoking history	Present	43 (78.2%)	59 (53.6%)	0.002	1.47 - 6.50	3.09
	Absent	12 (21.8%)	51 (46.4%)			
	Total	55 (100%)	110 (100%)			
Overweight	Present	30 (54.5%)	41 (37.3%)	0.035	1.04 - 3.89	2.02
	Absent	25 (45.5%)	69 (62.7%)			
	Total	55 (100%)	110 (100%)			
Obesity	Present	47 (85.5%)	74 (67.3%)	0.013	1.22 - 6.67	2.85
	Absent	8 (14.55)	36 (32.75)			
	Total	55 (100%)	110 (100%)			
Chronic kidney disease	Present	20 (36.4%)	16 (14.5%)	0.001	1.56 -7.20	3.35
	Absent	35 (63.6%)	94 (85.5%)			
	Total	55 (100%)	110 (100%)			
Arterial hypertension	Present	37 (67.3%)	54 (49.1%)	0.027	1.08 - 4.19	2.13
	Absent	18 (32.7%)	56 (50.9%)			
	Total	55 (100%)	110 (100%)			
Dyslipidemia	Present	27 (49.1%)	88 (80%)	0.000	0.11 - 0.48	0.24
	Absent	28 (50.9%)	22 (20%)			
	Total	55 (100%)	110 (100%)			

The modifiable risk factors considered in this research study, glycosylated hemoglobin greater than 7.5% (poor control), onychomycosis, peripheral vascular disease, peripheral neuropathy, smoking history, obesity, overweight, chronic kidney disease, hypertension, and dyslipidemia are statistically associated with diabetic foot. (Table 3.)

Patients who have dyslipidemia have 0.24 times more risk of developing diabetic foot, the association is statistically significant (p: 0.000), and because it presents an OR of 0.24 it behaves as a protection factor. It has a confidence interval of 0.11 - 0.48, that by not containing the unit it is statistically significant.

Table 4. Multivariate analysis of the variables associated with diabetic foot.

ASSOCIATED CONDITIONS		P VALUE	IC 95%	OR
Glycosylated hemoglobin	Bad control			
	Good control	0.029	1.171 - 17.685	4.551
	I presented	0.014	1.483 - 34.074	
Onychomycosis	Absent			
Peripheral vascular disease	I presented	0.229	0.642 - 6.341	2.018
	Absent			
	I presented	0.085	0.071 - 8.252	2.681
Peripheral neuropathy	Absent			
History of smoking	I presented	0.031	1.095 - 6.349	2.666
	Absent			
Arterial hypertension	I presented	0.101	0.865 - 5.103	2.101
	Absent			
Chronic kidney disease	I presented	0.047	1.014 - 9.013	3.023
	Absent			
Sickness time	> 10 years	0.000	4.121 - 39.608	12.777
	< 10 years			

In Table 4, in the multivariate analysis it is observed that the time of disease (OR: 12.777, CI: 4.121-39.608, p: 0.000), glycosylated hemoglobin poorly controlled (OR: 4.551, IC: 1,171- 17,685, p: 0.029),Onychomycosis (OR: 7,108, CI: 1,483-34,074, p: 0.014), history of smoking (OR: 2666, CI: 1095-6349, p: 0.031 and chronic kidney disease as comorbidity (OR: 3.023, CI: 1.014- 9.013, p: 0.047) are significantly associated with diabetic foot.

DISCUSSION

In the present study it was found that the male sex did not have a significant association to diabetic foot (OR: 0.86, CI: 0.45 - 1.65, p: 0.65). This result is contradicted by the study of Mildred[5], who reports that being male increases the risk of presenting diabetic foot (OR: 2, CI: 1.10 <OR <3.72, p: 0.01528), this could be attributed to the fact that the sample of males was insufficient.

There was no significant association between the

relation of advanced age, over 60 years old, and diabetic foot (OR: 0.63 IC: 0.30 - 1.33, p: 0.22). This result coincides with the study of Mildred[5], who reported OR: 1.65, indicating a slight association, which was not supported by the CI: 0.84- 3.25 or by the p-value that was greater than 0.05. It is inferred that in both cases not enough necessary sample was taken to demonstrate this association.

The time of evolution of the disease, greater than 10 years, presented a significant association with the development of diabetic foot (OR: 2.26, CI 1.13 - 4.52, p: 0.019), presenting it as a risk factor for developing diabetic foot. This result coincides with the study by Márquez-Godínez[6] (OR: 5.1, IC: 95% 2.8-9.4). In a study by Enciso[7], a significant association between the time of evolution of the disease and the onset of diabetic foot was not corroborated (p: 0.5). Similar results were found in the study of Mildred[5] in relation

to the time of evolution of the disease, no association

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was found between the time elapsed since the diagnosis of diabetes and the presence of diabetic foot (OR: 0.96). The percentage of glycosylated hemoglobin greater than 7.5%, as a margin of poor glycemic control, presented a significant association with diabetic foot (OR: 6.2, CI: 1.79 - 21.41, p: 0.001). However, in the Mildred[5] study this association was corroborated (OR: 1.18, CI: 0.64 <OR 2.16, p: 0.569). Márquez-Godínez[6], identified that glycosylated hemoglobin (HbA1c) ≥7.0% presents as a risk factor for developing diabetic foot (OR: 2.8, CI: 95% 1.5-5.0).

Peripheral vascular disease behaved like a risk factor for presenting diabetic foot (OR: 2.54, CI: 1.31 - 4.94, p: 0.005). In the study conducted by Flores[8], this variable presented OR: 3.75, 95% CI 2.73- 5.15, p: 0.00, a risk factor with significant association. Similarly, in the study by Mildred[5], a strong relationship with statistical significance could be established (OR: 13.62, CI: 6.23-30.34, p<0.001).

Peripheral neuropathy behaved like a risk factor for the development of diabetic foot (OR: 2.88, CI:1.45 - 5.72 and p: 0.002). In the study by Mildred[5], an important association was demonstrated between neuropathy and the presence of diabetic foot (CI <4.95 <OR 21.02 and p <0.05). In the study by Neyra[9], it was found as the main risk factor (OR of 71.8, p: <0.000) and in the Enciso[7] study. This variable behaved like a risk factor, although it was not statistically significant (OR: 2.3, CI: 95% 0.7-7.4, p: 0.2).

Patients with onychomycosis have 4.83 times more risk of developing diabetic foot, finding OR: 4.83, CI: 1.38 - 16.86 and p:0.007. This result is supported in the study by Enciso7, which showed a strong association between the presence of onychomycosis, and the possibility of triggering diabetic foot (OR: 2.8, CI: 95% 1.1- 7.2, p: 0.02).

Smoking history behaved as a significantly associated risk factor (OR: 3.09, CI: 1.47 - 6.50, p: 0.002). In the study carried out by Flores8, the smoking habit was tested as a risk factor associated with diabetic foot, finding OR: 3.27, CI: 95% 1.27-8.39 and p: 0.01, being significantly associated.

With regard to comorbidities as an associated risk factor for diabetic foot, it was found that arterial hypertension and chronic kidney disease are significantly associated, OR: 2.13, CI: 1.08- 4.19, p: 0.027 and OR: 3.35, CI: 1.56 - 7.20, p: 0.0021, respectively. The dyslipidemia comorbidity behaved as a protective factor with the development of diabetic foot, presenting OR: O.24, CI: 0.11- 0.48 and p: 0.000. In the Chinchari study, 10 arterial hypertension (p: 0.29) and dyslipidemia (p: 0.12), did not present significant differences to be considered a risk factor.

In the study by Neyra, 9 it was found that arterial hypertension behaved as a protective factor, finding a significant association (OR: 0.1, p: 0.0025).

CONCLUSION

Disease time greater than ten years is a non-modifiable risk factor associated with diabetic foot. In addition, glycosylated hemoglobin greater than 7.5% (poorly controlled), onychomycosis, a history of smoking, and comorbid chronic kidney disease are modifiable risk factors associated with diabetic foot.

Peripheral vascular disease, peripheral neuropathy, hypertension are not modifiable risk factors associated with diabetic foot.

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