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ORIGINAL ARTICLE

Correlation between diabetic foot and diabetic retinopathy in patients treated at the hospital provincial do Zaire, Angola

Correlación entre pie diabético y retinopatía diabética en pacientes del hospital provincial de Zaire, Angola

Correlação entre pé diabético e retinopatia diabética em doentes do hospital provincial do Zaire, Angola

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ABSTRACT

Introduction: diabetes mellitus leads to many associated complications, including diabetic neuropathy and diabetic angiopathy, both with a high incidence in the onset diabetic foot and including also the diabetic retinopathy disease cause of blindness. **Objective:** determine if there is any correlation between the onset diabetes foot and whether or not diabetic retinopathy present in patients treated at the Hospital Provincial, María Eugenia Neto, Zaire, Republic of Angola, from September 2020 to September 2020. **Method: a** descriptive study was carried out in 181 patients treated in the diabetic foot department of the aforementioned hospital; variables described were as follow: age, sex, associated chronic diseases, presence or absence of diabetic retinopathy, lower limb ulcers, limb amputation and years with diabetes. Bivariate correlation tests were performed, and the Pearson´s correlation coefficient was analyzed. **Results:** the average age was 59.3 years, the age group over 70 years (28.2%) and the female sex (57.5%) predominated. The 41.8% of patients presented previous amputations and 40.1% had ulcers. The 65.19% of patients had irregular treatment patterns, statistically strong and significant correlation between diabetic foot and diabetic retinopathy. **Conclusions:** there is evidence of a strong and significant relationship between patients with diabetic foot, who may suffer from a certain degree of diabetic retinopathy, more frequent in females after their sixth decade of life that cause a longer evolution of his disease.

Keywords: diabetic neuropathy; diabetic angiopathy; diabetic foot; diabetic retinopathy

RESUMEN

Introducción: la diabetes mellitus produce complicaciones, dentro de las cuales se describen la neuropatía diabética y la angiopatía diabética, que en presencia de estas puede llegarse a un cuadro de pie diabético sin dejar de mencionar la pérdida visual por retinopatía diabética. **Objetivo:** determinar la correlación existente entre la aparición de pie diabético y la presencia o no de la retinopatía diabética en pacientes del Hospital Provincial "María Eugenia Neto", Zaire, República de Angola, en el período comprendido entre septiembre de 2020 a septiembre de 2022. **Método:** se realizó un estudio descriptivo en 181 pacientes de la consulta de pie diabético del hospital antes dicho, donde se describieron variables, tales como: edad, sexo, enfermedades crónicas asociadas, presencia o no de retinopatía diabética, úlceras en miembros inferiores, amputación en miembros inferiores y años con diabetes. Se realizaron pruebas de correlación bivariable, se analizó el coeficiente de correlación de Pearson. **Resultados:** el promedio de edad fue de 59,3 años, predominó el grupo etario de más de 70 años (28,2 %) y el sexo femenino (57,5 %). Presentaron amputaciones previas un 41,8 % y úlceras un 40,1 %. Sin tratamiento estable el 65,19 %, correlación estadísticamente fuerte y significativa entre pie diabético y la retinopatía diabética. **Conclusiones**: se evidencia una fuerte y significativa relación existente entre los pacientes portadores de pie diabético, los cuales pueden padecer determinado grado de retinopatía diabética, más frecuentes en el sexo femenino después de la sexta década de la vida, con los cuales presentan mayor tiempo de evolución de su enfermedad.

Palabras clave: neuropatía diabética; angiopatía diabética; pie diabético; retinopatía diabética

RESUMO

Introdução: o diabetes mellitus produz complicações, dentre as quais são descritas a neuropatia diabética e a angiopatia diabética, que na presença destas podem levar ao quadro de pé diabético, sem falar na perda visual pela retinopatia diabética. **Objectivo:** determinar a correlação existente entre o aparecimento de pé diabético e a presença ou ausência de retinopatia diabética em doentes do Hospital Provincial "María Eugenia Neto", Zaire, República de Angola, no período de setembro de 2020 a setembro de 2022. **Método**: estudo descritivo realizado em 181 pacientes do ambulatório de pé diabético do referido hospital, onde foram descritas variáveis como: idade, sexo, doenças crônicas associadas, presença ou ausência de retinopatia diabética, úlceras de membros inferiores, amputação de membros inferiores e anos com diabetes. Foram realizados testes de correlação bivariada e analisado o coeficiente de correlação de Pearson. **Resultados:** a média de idade foi de 59,3 anos, predominando a faixa etária acima de 70 anos (28,2%) e o sexo feminino (57,5%). 41,8% tinham amputações anteriores e 40,1% tinham úlceras. Sem tratamento estável 65,19%, correlação estatisticamente forte e significativa entre pé diabético e retinopatia diabética. **Conclusões:** existe evidência de uma relação forte e significativa entre os doentes com pé diabético, que podem sofrer de um certo grau de retinopatia diabética, mais frequente no sexo feminino a partir da sexta década de vida, com os quais apresentam maior evolução da sua doença.

Palavras-chave: neuropatia diabética; angiopatia diabética; pé diabético; retinopatia diabética

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INTRODUCTION

About 500 million people in the world have diabetes mellitus (DM), more than 50% live in poor and developing countries, which directly causes about 250 thousand deaths each year. The incidence and prevalence of DM is increasing dramatically every year, and has been more pronounced during the last thirty years.[1]

In the course of its evolution, DM causes dissimilar damage to the peripheral circulatory system, decreasing blood flow, which leads to the appearance of diabetic angiopathy in addition to nerve disorders (neuropathy); both cause tissue damage which conditions the appearance of diabetic foot, and can lead to amputation of the lower limbs.[2]

DM, like all chronic non-communicable diseases, produces chronic complications: coronary heart disease, cerebrovascular and peripheral vascular disease are identified as macrovascular and, within the microvascular ones, retinopathy and nephropathy are found.[3,4]

These complications are often the reason for attendance at medical centers of all levels, with high levels of hospital admissions worldwide and high economic costs for health services, family and businesses.[5,6]

There are studies estimating that patients with diabetic foot at the moment of being diagnosed with DM type 2 oscillate between 10 %; as well as between 15 % and 25 % of the patients with diabetes could develop at some point in their lives foot ulcers.[7,8]

Studies[9,10] showed that patients with diabetes develop some type of diabetic retinopathy (DR) in the order of 35%, and allude that 7% of these patients develop proliferative retinopathy, which could cause irreversible blindness.

By 2030 it is estimated that there will be 5.2% of cases of blindness worldwide caused by proliferative diabetic retinopathy or more severe stages and that 3.8% of moderate to severe visual disturbances are based on diabetes.[11,12]

It is of vital importance that the World Health Organization (WHO) has DM as a priority line of work, due to all the complications that this disease causes both systemically to the individual, overloading health systems and the damage it causes both to the family economy and to national economies.[13]

In Africa, as in the whole world and specifically in Angola, there is an increase in the prevalence of DM, as well as other non-communicable diseases.[14]

Therefore, in the absence of similar studies in the African region, the group of authors undertook the task of conducting this study with the aim of determining the correlation between the occurrence of diabetic foot and the presence or absence of diabetic retinopathy in patients treated at the Provincial Hospital of Zaire "Maria Eugenia Neto".

METHOD

A descriptive, cross-sectional, retrospective cohort study was conducted at the Maria Eugenia Neto Provincial Hospital in the province of Zaire, Republic of Angola, during the biennium September 2020 to September 2022.

This type of analysis made it possible to establish the correlation between two complications of diabetes in the group of patients for whom the statistical information was collected.

The universe of the study consisted of 181 patients with a diagnosis of diabetic foot, which in turn formed the study sample.

Sociodemographic variables were taken into consideration as secondary variables: age and sex. The main variables of the study were clinical variables, such as: associated chronic diseases, presence or absence of diabetic retinopathy, lower limb ulcer, lower limb amputation, years with diabetes.

The Meggitt-Wagner classification was used, as it is the best known and most widely used staging system for diabetic foot lesions. This system consists in the use of 6 categories or grades of diabetic foot.[15]

The ophthalmologic assessment allowed us to obtain information on the presence or not of diabetic retinopathy, for which we used the classification of the Spanish Society of Retina and Vitreous (SERV) and accepted by the Spanish Society of Ophthalmology (SEO), known as the SERV and SEO classification.[16]

Inclusion criteria were patients with therapeutic follow-up in this office whose medical history was prepared and informed consent was attached.

The exclusion criteria were patients whose follow-up of the lesion was impossible, either because they had been discharged or transferred before definitive treatment, patients who had undergone post-operative diabetic retinopathy, patients with a diagnosis of retinopathy associated with other pathologies and patients with bilateral cataract that made it impossible to make a diagnosis of diabetic retinopathy.

The researchers compiled the information and created a database in Microsoft Excel, which was processed automatically with the help of the SPSS statistical package in version 20.0 for Windows.

A first level of descriptive analysis of the socio-demographic variables and the rest of the variables included in the questionnaire was carried out.

Bivariate correlation tests were performed, analyzing Pearson's correlation coefficient, which makes it possible to determine whether there is a linear relationship between two variables at the interval level and that this relationship is not due to chance, making it possible to determine whether the relationship is statistically significant or not.

The results were reflected in tables and graphs, expressed in absolute and relative frequencies, making possible the collection of information and the typification of the different variables studied during the course of the research.

All the information of the study was obtained from the patients' medical records and the study was approved by the Ethics and Research Committee of the Maria Eugenia Neto Provincial Hospital in accordance with local and international regulations, being considered a risk-free scientific research.

RESULTS

The mean of the quantitative value of the studied variable diabetic foot grade was 3.97, which indicates that grade 3 and 4 patients prevailed, as it shows the position of each patient according to the complexity of their behavior or their degree of affectation with respect to diabetes.[17] The result can be appreciated in Table 1; this was considered to be in relation to the grades of diabetic foot, ranging from 0 to 6.

Table 1. Quantitative value of the variables studied

		Statistics								
		Sex	**Age group**	**Diabetic retinopathy**	**Associated chronic diseases**	**Time of evolution**	**Previous amputation**	**Presence of ulcers**	**Treatment stable**	**Degrees of diabetic foot**
N	Valid	181	181	181	181	181	181	181	181	181
	Missing	-	0	0	0	0	0	0	0	0
Mean		1.57	3.55	1.43	1.60	2.75	1.58	1.80	1.65	3.97
Median		2.00	4.00	1.00	2.00	3.00	2.00	2.00	2.00	4.00
Minimum		1	1	1	1	1	1	1	1	1
Maximum		2	5	2	2	5	2	2	2	6

Source: Clinical records of diabetic foot consultation. Hospital Provincial María Eugenia Neto, Statistics issued by SPSS in its Windows version 20.0.

It is noteworthy that the age group best represented in the sample was over 70 years of age with 28.2% and, in second place, the group between 61 and 70 years of age with 27.7%, with an average age of 59.3 years. From the sexual angle, women represented 57.5%.

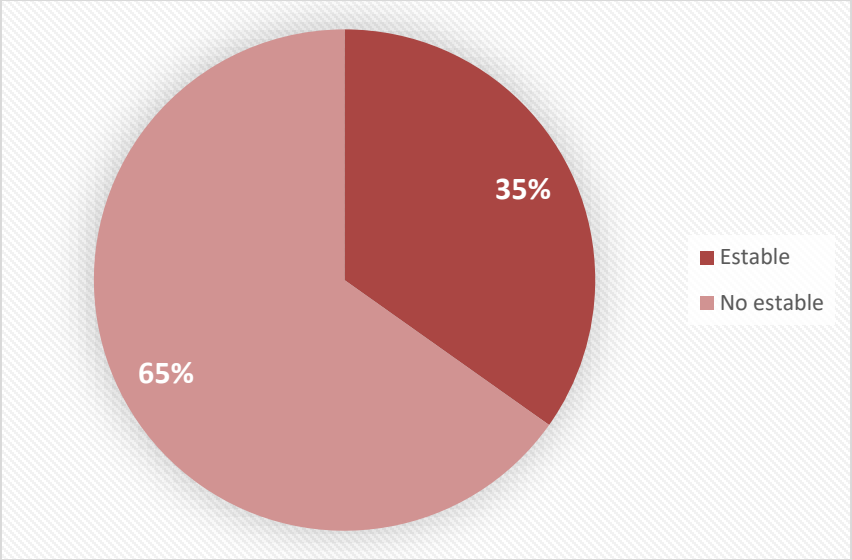
Among the participants in the study, the time of evolution of the disease manifested higher frequencies in the age ranges between 6 and 10 years with 48 people (26.5%), followed by the group 11 to 15 years with a total of 47, which represented 26.0%.

Of the patients, 40.1% had associated chronic diseases, 41.8% were previous amputees and 19.8% had ulcers.

Table 2. Age group according to general sociodemographic characteristics

General characteristics	Sample
Average age 59.3 years	181
Age group	
0 - 20	7 (3.9 %)
21-40	38 (21.0 %)
41-60	35 (19.3 %)
61-70	50 (27.6 %)
70+	51 (28.2 %)
Sex	
Male	77 (42.5 %)
Female	104 (57.5 %)
Time of evolution of the disease	
Up to 5 years old	33 (18.2 %)
6 to 10 years	48 (26.5 %)
11 to 15 years old	47 (26.0 %)
16 to 20 years	38 (21.0 %)
More than 20 years old	15 (8.3 %)
Associated chronic diseases	73 (40.1 %)
Previous amputation	76 (41.8%)
Presence of ulcers	36 (19.8 %)

Figure 1 shows the disposition of patients according to compliance with treatment for diabetes, where 65% did not present stable treatment by any of its modalities, non-compliance with diet and regular and stable administration of medication.



Graphic 1. Distribution of patients according to compliance with treatment

Source: Clinical records of diabetic foot consultation. María Eugenia Neto Provincial Hospital, Statistics issued by SPSS in its Windows version 20.0.

Regarding the classification of DR in the patients studied (Table 3), 39 (21.4 %) had high-risk DR, 35 (19.2 %) manifested advanced DR and 26 (14.3 %) had presence of proliferative DR. This means that 96 (53.03 %) of the total had advanced degrees of DR.

Table 3. Correspondence of patients according to degrees of diabetic retinopathy

	Diabetic retinopathy	Frequency	Percent	Valid Percent	Cumulative Percent
Classification	No DR	25	13.7	13.8	13.8
	Non-proliferative DR	25	13.7	13.8	27.6
	Proliferative DR	26	14.3	14.4	42.0
	High risk DR	39	21.4	21.5	63.5
	Advanced DR	35	19.2	19.3	82.8
	Diabetic macular edema	31	17.0	17.1	100.0
	Total	**181**	**99.3**	**100.0**	

Source: Clinical records of diabetic foot consultation Hospital Provincial María Eugenia Neto. Statistics issued by SPSS Windows version 20.0

Regarding the degrees of the diabetic foot (Table 4), Grade 3 prevailed with 45 people representing 24.9%, with the same result Grade 4 was found, Grade 2 with 37 (20.4%) and Grade 5 with 26 (14.4%). It is highly significant that 153 (84.5%) patients manifested the disease to a developed degree.

Table 4. List of patients by degree of diabetic foot

	Diabetic retinopathy	Frequency	Percent	Valid Percent	Cumulative Percent
Classification	Grade 0	10	5,5	5,5	5,5
	Grade 1	18	9,9	9,9	15,5
	Grade 2	37	20,4	20,4	35,9
	Grade 3	45	24,9	24,9	60,8
	Grade 4	45	24,9	24,9	85,6
	Grade 5	26	14,4	14,4	100,0
	Total	**181**	**100,0**	**100,0**	

Source: Clinical records of diabetic foot consultation Hospital Provincial María Eugenia Neto. Statistics issued by SPSS Windows version 20.0

For the analysis of the correlations between the scale variables of the study (time of evolution, diabetic retinopathy and degrees of diabetic foot evolution) the Pearson's coefficient was used.[18]

As can be seen in Table 5, it is possible to appreciate a strong and positive correlation between the time of evolution of the disease with diabetic retinopathy and degrees of diabetic foot (0.640 and 0.146) respectively, although the latter was weaker than the former.

This same indicator for the correlation between diabetic retinopathy with time of evolution and degrees of diabetic foot was also strong and significant, 0.640 and 0.630, respectively. For the variable degrees of diabetic foot, the Pearson coefficient was 0.146 for the correlation with time of evolution and 0.630 for diabetic retinopathy, both showing a high correlation. In all cases it was verified that the weakest correlation is with the time of evolution of the disease.

Table 5. Correlation between diabetic retinopathy, diabetic foot and time of evolution of the disease

		Time of evolution	Diabetic retinopathy	Diabetic foot grade
Time of evolution	Pearson Correlation	1	0,640**	0.146*
	Sig. (2-tailed)		0,000	0.050
	N	181	181	181
Diabetic retinopathy	Pearson Correlation	0.640**	1	0.630**
	Sig. (2-tailed)	0.000		0.000
	N	181	181	181
Diabetic foot grade	Pearson Correlation	0.146*	0.630**	1
	Sig. (2-tailed)	0.050	0.000	
	N	181	181	181

Source: Clinical records of diabetic foot consultation Hospital Provincial María Eugenia Neto. Statistics issued by SPSS in its Windows version 20.0.

DISCUSSION

Chiquito M[19] in his thesis shows that 25% of type II diabetics, in the evolution of their disease, present variable degrees of diabetic foot affectation, with 50% suffering from ulcers, requiring intrahospital care, with a ratio of 1 in 5 requiring amputation of the injured limb; These figures do not coincide with those found by the authors, since ulcers were found in 19.8% of those investigated, but with Puglla Tinajero,[20] who in his thesis shows a similar number of patients with amputations and ulcers.

Epidemiologically, 52% belong to the male sex, over 61 years of age, 61% of the cases and 32% between 46 and 60 years of age registering similar values. In contrast to the 54% of this population with less than 10 years of evolution of this disease, in the present study this percentage corresponds to those with more time with the disease.[19,20]

Moncayo Zambrano[21] in his study exposed that the main risk factor, being represented in 54%, is poor treatment, inadequate control or lack of control in 46%, being these values very different from those found in the investigation, because 65.1% did not present a stable treatment of diabetes; These indices are within the parameters presented by PAHO in the Americas where they are found to be between 50 to 70% uncontrolled, and those also found by Bajaña Peña[22] in his thesis with 58% without adherence to treatment.

According to Chávez Rodríguez[23], 82 out of 99 identified with DM also have DR. Very similar statistics show in this research, that out of 181 diabetic patients, 156 present some degree of diabetic retinopathy, not coinciding the data regarding the different degrees of diabetic retinopathy, finding that about 60 percent of the patients treated have proliferative diabetic retinopathy, this same complication of advanced degree 30.5%, 18.3% moderate proliferative and proliferative with high risk 10.9%. Non-proliferative diabetic retinopathy was found to be represented by 40.3%, 18.3% of the patients had severe cases, 15.9% had mild cases and 6.1% had moderate cases.

Acuña Guillén[24] demonstrated that patients with the complications analyzed in this research have 4.38 times more risk of suffering amputation of a compromised limb. This association is ratified by the confidence interval (1.77-10.84), corresponding to the range of figures whose distribution is normal, which allowed observing the precision of the estimation of the difference made with the sample.

Furthermore, a statistically significant association was found between diabetic retinopathy and risk of amputation in patients with diabetic foot (p=0.000), meaning a high level of certainty, showing regularly between 95% or 99%, that this correlation is true and not due to chance.

The results obtained by the authors in this study allowed us to appreciate that in our sample there is a strong and positive correlation between the time of evolution of the diabetic foot disease with the development of some degree of diabetic retinopathy, this quantification of the strength is given by the linear relationship between two quantitative variables: the presence of some degree of diabetic foot and the presence of some degree of diabetic retinopathy, studied by means of the calculation of the Pearson correlation coefficient[14,25,26]; that this coefficient ranges between -1 and +1. A value of -1 indicates a linear relationship or perfect positive straight line. A correlation close to zero indicates that there is no linear relationship between the two variables. A value of 0 indicates that there is no linear association between the two variables under study, i.e. it is not given at random.[14,25,26].

A coefficient of reduced value does not necessarily indicate that there is no correlation, since the variables may present a non-linear relationship, thus reflecting the existing correlation between these variables, which also expressed a statistically significant association.[14,25,26]

CONCLUSIONS

There is evidence of a strong and significant relationship between patients with diabetic foot disease belonging to the Provincial Hospital "María Eugenia Neto", Angola, who may suffer a certain degree of diabetic retinopathy, more frequent in the female sex, after the sixth decade of life, with those who present a longer evolution time of their disease.

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