Original Article

Relationship Between Family Functioning and Degree of Diabetic Foot Injury in Patients with Type 2 Diabetes Mellitus

Relación entre funcionamiento familiar y grado de lesión de pie en pacientes con diabetes mellitus tipo 2

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Summary

Objective: to analyze the relationship between family functioning and the degree of foot injury in patients with type 2 diabetes mellitus (DM2). **Methods:** cross-sectional study. Sample of 286 patients with a diagnosis of type 2 diabetes mellitus and diabetic foot, hospitalized in a second level institution. The FACES III instrument and the Meggit-Wagner scale were applied. The association between variables was determined using the χ^2 goodness-of-fit test. **Results**: mean age was 57±14.2 years. There were more men (60.8%), married (54.9%) and workers (38.1%). Systemic arterial hypertension was the comorbidity with the highest incidence (65.7%). 52.4% of the participants showed balanced family functionality. The most predominant degree of injury was grade I (40.6%), followed by grade II (21.7%). Family dysfunctionality was identified as increasing the risk of presenting a higher degree of diabetic foot injury (OR of 10.0, p<0.0001). **Conclusions:** patients with family dysfunctionality are ten times more at risk of presenting a higher degree of diabetic foot involvement. Diabetic foot is a frequent complication with high impact for the patient and his family, it is up to the health team to develop interventions focused on the family to prevent its occurrence and limit the damage.

Keywords: Diabetic Foot, Comorbidity, Family relationships.

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Resumen

Objetivo: analizar la relación entre funcionamiento familiar y el grado de lesión de pie en pacientes con diabetes mellitus tipo 2 (DM2). **Métodos:** estudio transversal. Muestra de 286 pacientes con diagnóstico de diabetes mellitus tipo 2 y pie diabético, hospitalizados en una institución de segundo nivel. Se aplicó el instrumento FACES III y escala Meggit-Wagner. Se determinó la asociación entre las variables mediante la prueba de bondad de ajuste χ^2. **Resultados:** la edad media fue de 57±14.2 años. Predominó el sexo masculino (60.8%), casados (54.9%) y obreros (38.1%). La hipertensión arterial sistémica fue la comorbilidad de mayor incidencia (65.7%). 52.4% de los participantes mostraron funcionalidad familiar balanceada. El grado de lesión con mayor predominio fue el grado I (40.6%), seguido del grado II (21.7%). Se identificó que la disfuncionalidad familiar aumenta el riesgo de presentar un mayor grado de lesión del pie diabético (OR de 10.0, p<0.0001). **Conclusiones:** los pacientes con disfuncionalidad familiar tienen diez veces más riesgo de presentar un mayor grado de afectación del pie diabético. El pie diabético es una complicación frecuente y de alto impacto para el paciente y su familia, corresponde al equipo de salud desarrollar intervenciones centradas en la familia para prevenir su aparición y limitar el daño.

Palabras clave: pie diabético, comorbilidad, relaciones familiares

Introduction

Diabetes mellitus is currently considered a serious public health problem due to its high prevalence, morbidity, and mortality.[1,2] It is estimated that 422 million people are diagnosed with diabetes worldwide. The treatment that people with diabetes must adhere to is complex and requires multidisciplinary support in order to reduce risk factors and treat the patient's various clinical situations. When there is no glycemic control, cardiovascular pathologies, ophthalmic problems and even renal and peripheral nerve damage can be developed.[1,2]

Diabetes itself causes a crisis condition due to the lifestyle transition of the patient and his or her family from diagnosis to treatment and its complications. Accordingly, the control of the person's glucose level can be impaired when there is no adequate adaptation process, causing abnormal behavior and lack of adherence to treatment.[3]

Adaptation to the new lifestyle requires support systems such as family, which has been identified as an important component of diabetes self-care.[4] It has also been considered that family has an influence in achieving a certain balance, order and unity in the face of the demands of the life cycle of each of its members.[5]

Although there is evidence that the family influences the adaptive processes of family members with diabetes, not all members participate in this process. The main support of these patients is the spouse, who collaborates with various aspects of the treatment with emphasis on diet management.[6] The high lethality and presence of secondary complications of this pathology requires the support of more than one family member, as well as the management of all the components that make up the treatment, with the aim of achieving adherence and avoiding secondary complications.

A secondary complication of high incidence is diabetic foot, which is characterized by deep tissue injury,[1,7] causing considerable morbidity and mortality in the west part of the world, as well as requiring complex and costly care. If it cannot be cured, the outcome is amputation of the limb. It is estimated that a person with diabetes has a 19-34% chance of developing a foot ulcer during his or her lifetime. In addition, the recurrence of ulcers is very high, 40% will recur within one year and 65% will recur in approximately five years.[8]

The above allows visualizing the relevance of family participation in the management of self-care and adherence to treatment, since it implies changes in the lifestyle of all members and can affect family functionality.[9] The family can be defined as: "the set of interpersonal relationships that are generated within each family and that give it its own identity", which is governed by rules or patterns of interaction that spread to the qualities of each of its members.[10] It has been shown that the interaction between family members, as well as the generation of affective bonds (cohesion), maintain the capacity to change its structure in order to overcome family evolutionary difficulties (adaptability).[11] In this regard, it is necessary to extend knowledge towards the interaction of the members and their influence on the degree of diabetic foot. Given the importance of these variables, the aim of the present study was to analyze the relationship between family functioning and the degree of foot injury in patients with diabetes.

Methods

Cross-sectional study, developed during the period from December 2019 to September 2020, randomly selected sample of 286 patients with a diagnosis of type 2 diabetes mellitus (DM2) hos-

pitalized in the emergency area, surgery and internal medicine services of the General Hospital of the Zone number 4 in Celaya, Guanajuato. The study was approved by the Local Health Research Committee 1003 registered under the R-2019-1003-034 number. Patients who met the inclusion criteria were invited to participate: 1. age equal to or older than 18 years with a diagnosis of diabetic foot, hospitalized in the aforementioned areas; and 2. who, after explaining the objective, agreed to participate voluntarily in the research.

A direct question questionnaire was applied to determine the sociodemographic characteristics such as age, marital status, level of studies, profession and time of evolution of the disease. The degree of family functionality was obtained by applying the FACES III instrument, which measures the cohesion and adaptability of the family.[12,13] To determine the degree of diabetic foot injury, the Meggit-Wagner scale was used, which consists of six levels.[14]

For the statistical analysis, SPSS v. 25 software was used. For the description of the numerical variables, measures of central tendency and dispersion were used, and for the categorical variables, frequency tables and percentages were used. To determine the association between the variables by means of the χ^2 goodness-of-fit test was sought, with a significance of <0.05, and the probability of occurrence with the Odds Ratio (OR) statistic, with a significance of <0.05.

Results

The sample consisted of 286 participants whose mean age was 57±14.2 years, men predominated with 60.8% and most of them reported marital status as married (54.9%). 32.2% reported having a high

Table 1. Sociodemographic Data of the Study Sample

Variable		Frequency (fr)	Percentage (%)
Gender	Men	174	60.8%
	Women	112	39.2%
Marital Status	Married	157	54.9%
	Single	47	16.4%
	Widow(er)	58	20.3%
	Divorced	24	8.4%
Schooling	None	35	12.2%
	Elementary	79	27.6%
	Junior High School	92	32.2%
	High School	54	18.9%
	Technician	18	6.3%
	Bachelor's Degree	8	2.8%
Occupation	Worker	109	38.1%
	Household	58	20.3%
	Retiree	65	22.7%
	Merchant	30	10.5%
	Professional employee	6	2.1%
	Unemployed	18	6.3%

Table 2. Comorbidities of People with Diabetic Foot Involvement

Variable		Frequency (fr)	Percentage (%)
Systemic Arterial Hypertension	Yes	188	65.7%
	No	98	34.3%
Obesity	Yes	181	63.2%
	No	105	36.2%
Renal Chronic Disease	Sí	69	24.1%
	No	217	75.9%
Retinopathy	Sí	28	9.7%
	No	258	90.3%
Dyslipidemia	Sí	21	7.3%
	No	265	92.7%
Others	Yes	12	4.1%
	No	274	95.9%

school education and the most reported occupation was worker (38.1%); see Table 1.

The comorbidity with the highest presence in this group was systemic arterial hypertension (SAH), followed by obesity and chronic kidney disease; see Table 2.

The family cohesion dimension refers to the degree of emotional union perceived by family members. In relation to the above, the majority (41.25%) of the subjects showed a related type of cohesion. Family adaptability refers to the capacity to adapt to the change in roles, rules and leadership experienced by the family at any given time. It was found that in the patients' perception, structured adaptability predominates in their family in 50.1% of the cases; see Table 3.

Families were classified in relation to the circumflex model scheme in which the functional is located in the center of the table and the most dysfunctional is located at the extremes. It was found that 52.4% of the subjects are located in a balanced family functionality; which favors the functioning and integration of the individuals who compose it. 47.6% maintain a family functionality in the medium (30.2%) and extreme (17.4%) range; these are the ones that characterize a more problematic family system; see Table 3.

In regards to the time of evolution of diabetes in the participants, a mean of 12.22±8.9 years was obtained and that of the diabetic foot ulcer was 6.49±8.06 months. The most predominant grade of diabetic foot ulcer lesion was grade I with 40.6%, followed by grade II with 21.7% and then grade III with 16.1%, grade IV with 14.7% and, finally, grade V, the most severe, with 7%.

Table 3. Family Functionality: Adaptability and Cohesion of People with Diabetic Foot Disease

			Family Cohesion				
			Disaggregate	Semi-related	Related	Agglutinated	Total
Family Adaptability	Chaotic	fr	5	10	13	20	48
		%	1.7%	3.5%	4.5%	7%	16.78%
	Flexible	fr	3	13	20	13	49
		%	1%	4.50%	7%	4.50%	17.13%
	Structured	fr	15	44	73	11	143
		%	5.2%	15.4%	25.5%	3.8%	50%
	Rigid	fr	17	9	12	8	46
		%	5.9%	3.1%	4.2%	2.8%	16.08%
Total		fr	40	76	118	52	286
		%	13.98%	26.57%	41.25%	18.18%	100%

Table 4. Family Functionality and Degree of Diabetic Foot Ulcer Injury

		Diabetic Foot (Meggit-Wagner)				
		Grade I	Grade II	Grade III	Grade IV	Grade V
Functional	fr	90	38	19	3	0
	%	60.00%	25.30%	12.70%	2.00%	0.00%
Dysfunctional	fr	26	24	27	39	20
	%	19.1%	17.6%	19.9%	28.7%	14.7%

According to the obtained data, there is a tendency to a decrease in the degree of affectation as family functionality is balanced, while when there is a marked predisposition to have dysfunction in the family, it is observed that the percentage of cases with a higher degree of affectation is higher (see Table 4). Patients with dysfunctional families are ten times more at risk of having a greater injury than patients with a functional family (OR of 10.0, 95% CI, 5.6 - 17.714 p<0.0001).

Thus, a significant association is observed between family functionality and the degree of diabetic foot ulcer lesion; that is, where there is family dysfunctionality, a higher degree of diabetic foot ulcer lesion χ^2 is seen with a significance of 0.0000.

Discussion

Upon analyzing the sociodemographic characteristics, it was possible to verify that the profile of the participants in the present study corresponds to those presented by other authors of national and international research; men predominates,[15-18] due to the fact that men are more frequently exposed to injuries derived from their work activities,[15,17] exert more force, are late in seeking medical attention if they present any anomaly and have less metabolic control than women;[17,18] likewise, inadequate footwear, less hygienic foot conditions, mycosis and inadequate nail trimming predominate in them. [15,19,20]

Diabetic foot is frequently associated to cardiovascular disease factors such as arterial hypertension,[15,16,18] which is confirmed by the highest prevalence of comorbidity identified in the present study.

It is important not to lose sight of the fact that diabetic foot lesions encompass a series of alterations that people with advanced diabetes mellitus can present.[19] The age group that most frequently presents diabetic foot lesions are adults over 50 years of age; it is also added a time of evolution of diabetes mellitus of more than ten years;[15,18] studies report that the longer the time of evolution, the lower the attachment and the greater the presence of alterations and complications in the patient with diabetes mellitus.[18,20] The alterations include vasculopathy and peripheral neuropathy, Charcot neuroarthropathy, plantar ulcers, osteomyelitis and the final complication of these processes: the presence of diabetic foot lesions, even lower limb amputation.[19,20]

Socioeconomic and labor aspects determine the quality of self-care in the patient with diabetic foot;[21] in this regard, the prevalence of basic schooling such as elementary and junior high school is identified, which can be a risk factor for the population with diabetes mellitus, due to the relationship with self-care activities and the economic access to which it is associated.

In the evolution of diabetic foot lesions, prolonged recovery times are common.[18] Ulcer healing may require several weeks or months, depending on the size and location of the infection and the adequacy of circulation.[18,19] Given the above, outpatient management takes on great relevance and the family environment is an essential point for a favorable evolution.

In this study, patients most frequently reported a balanced functionality, in contrast to this, Lopez[22] points out that a large number of participants in his study (75.7%) perceived their family as dysfunctional.[22] This indication allows us to visualize the repercussion that the family situation has on the health of its members. A study carried out in Chile mentioned that patients with diabetes who come from families with moderate and severe dysfunction are more susceptible to decompensation (χ=24.22, p= 0.003),[23] a similar result obtained in this research, when associating family functionality and the degree of diabetic foot.

This thesis is supported by the qualitative study of Rodriguez *et al,*[21] which places the family as the cornerstone of care, since it plays an important role as a source of advice and control in the follow-up of care; the family nucleus also functions as an engine for the mobilization of the patient in the search for health care. Patients with a favorable family environment significantly increase their knowledge of the disease, reduce stress and improve the application of treatment; in contrast to those who live in an inappropriate family environment.[19,21]

Strengths. It is a research that studies family functionality as a potential influence on the evolution of the degree of diabetic foot, in scientific literature the treatment of diabetic foot ulcer makes greater reference to the technologies in the healing processes.[24-26]

Limitations. The association of categorical variables allows identifying areas of opportunity in the construction and extension of knowledge. Nevertheless, studies involving more complex variables are required to strengthen the phenomenon, in addition to considering other instruments that evaluate the participation of the family, in order to generate models of multidisciplinary care. In addition, there are questions

about the relevance of certain approaches related to the study of family functionality that should be properly assessed.

Conclusions

Patients with family dysfunction are ten times more at risk of presenting a higher degree of diabetic foot involvement, this is a frequent complication and of high impact for the patient and his family, it corresponds to the health team to develop integrative interventions focused on the person and his family aimed at preventing its appearance or unfavorable evolution.

A balanced family functionality enables an adequate support system for adherence to treatment and prevention of complications such as diabetic foot or, damage limitation.

Although this study was conducted in the hospital setting, community work and primary health care are identified as an area of opportunity for the patient and family to be active agents in the care of their health, which will result in the prevention of diabetic foot lesions and therefore in the maintenance of their quality of life and family functionality.

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