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Comparison of pain and quality of life between individuals with and without diabetic neuropathy

Comparação da dor e qualidade de vida entre indivíduos com e sem neuropatia diabética

Comparación del dolor y la calidad de vida entre individuos con y sin neuropatía diabética

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Abstract: **Objective**: to compare pain and quality of life in individuals with and without diabetic neuropathy. **Method**: a cross-sectional study with 251 participants with type 2 diabetes mellitus. The Leeds Assessment of Neuropathic Symptoms and Signs (LANSS) scale was used to assess diabetic neuropathy, pain characteristics, loss of protective sensitivity (LPS) and to assess the quality of life by Short-Form 6 Dimensions-Brasil/SF-6D. Descriptive statistical analysis was performed. **Results**: among the participants, 16.3% had neuropathy, 97.6% complained of pain, most of them chronic and in the feet or calves. Also, 51.2% of neuropathic patients had LPS in the monofilament test (p=0.001). The pain descriptors most frequently reported by neuropathic patients were: burning (p=0.004), tingling (p=0.002), and pinprick and/or needling (p=0.003). The affected quality of life domains were: pain, mental health, and vitality. **Conclusion**: those with neuropathy have greater pain intensity, wake up at night, and have altered foot sensitivity, which can be tracked in primary care.
Descriptors: Nursing; Diabetes Mellitus; Diabetic Neuropathies; Quality of Life; Primary Health Care

Resumo: Objetivo: comparar a dor e a qualidade de vida de indivíduos com e sem neuropatia diabética. **Método:** estudo transversal realizado com 251 participantes com diabetes mellitus tipo 2. Utilizou-se a escala *Leeds Assessment of Neuropathic Symptoms and Signs* (LANSS) para avaliar neuropatia diabética, características da dor,

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perda de sensibilidade protetora (PSP) e avaliar a qualidade de vida pelo *Short-Form 6 Dimensions*-Brasil/SF-6D. Realizou-se análise estatística descritiva. **Resultados:** 16,3% apresentaram neuropatia, 97,6% queixaram-se de dor, sendo a maioria crônica e nos pés ou panturrilhas. 51,2% dos neuropáticos tiveram PSP no teste do monofilamento (p=0,001). Os descritores de dor mais referidos pelos neuropáticos: queimação (p=0,004), formigamento (p=0,002) e alfinetada e/ou agulhada (p=0,003) e os domínios de qualidade de vida afetados foram: dor, saúde mental e vitalidade. **Conclusão:** aqueles com neuropatia têm maior intensidade de dor, acordam à noite e apresentam alteração na sensibilidade dos pés, que pode ser rastreada na atenção primária.
Descritores: Enfermagem; Diabetes Mellitus; Neuropatias Diabéticas; Qualidade de Vida; Atenção Primária à Saúde

Resumen: **Objetivo**: comparar el dolor y la calidad de vida en individuos con y sin neuropatía diabética. **Método**: estudio transversal con 251 participantes con diabetes mellitus tipo 2. Se utilizó la escala *Leeds Assessment of Neuropathic Symptoms and Sign*s (LANSS) para evaluar la neuropatía diabética, las características del dolor, la pérdida de sensibilidad protectora (PSP) y para evaluar la calidad de vida por Short-Form 6 Dimensiones-Brasil/SF-6D. Se realizó análisis estadístico descriptivo. **Resultados**: el 16,3% presentaba neuropatía, el 97,6% se quejaba de dolor, la mayoría crónico y en pies o pantorrillas. El 51,2% de los pacientes neuropáticos tenían PSP en la prueba de monofilamento (p = 0,001). Los descriptores de dolor informados con mayor frecuencia por los pacientes neuropáticos fueron: ardor (p = 0,004), hormigueo (p = 0,002) y pinchazo y/o punción (p = 0,003) y los dominios de calidad de vida afectada fueron: dolor, salud mental y vitalidad. **Conclusión**: las personas con neuropatía tienen mayor intensidad de dolor, se despiertan por la noche y tienen alteración de la sensibilidad de los pies, lo que se puede rastrear en atención primaria.
Descriptores: Enfermería; Diabetes Mellitus; Neuropatías Diabéticas; Calidad de Vida; Atención Primaria de Salud

Introduction

According to the Brazilian Diabetes Society and the International Diabetes Federation, 1 in every 11 adults worldwide has diabetes mellitus (DM), which represents approximately 424.9 million people. It is also predicted that by 2045, about 628.6 million people will have DM worldwide. However, 50% of these individuals have not yet been diagnosed.[1-2] In developing countries, the number of cases of DM has been increasing steadily. Brazil has an estimated 14.3 million individuals with DM, about 9.4% of the population.[3-4]

After diagnosis, proper disease control is essential, as it aims to prevent complications arising from DM, which in the long term may have complications such as the presence of chronic pain and, consequently, affect the quality of life (QOL).[2-3] Complications of DM have a high prevalence and can be classified as microvascular (nephropathy, retinopathy, and

neuropathy) and macrovascular (peripheral vascular disease, coronary artery disease, and stroke).[2,5] In this sense, diabetic neuropathy (DN) stands out. It is a complication that can be present even in the phase that precedes DM (pre-diabetes)[6] and especially in type 2 diabetes mellitus (DM2), in the presence of hyperglycemia positively related to microvascular complications.[1-2,5] DN affects about 50% of patients and usually occurs ten years after the diagnosis of DM2, which can be considered painful or non-painful.[6-7]

The main clinical manifestations of DN are paresthesia or burning of the lower limbs (LL), tingling, stabbing, shocks, needling in legs and feet, discomfort or pain at the light touch, and/or minimal stimulation and reduction or loss of tactile and thermal sensitivity or painful. Signs and symptoms progressively affect the lower limbs and may affect the upper limbs symmetrically.[2,5] Thus, pain is considered a way of signaling neurological complications of lower limbs arising from DM2.[2]

In general, as the disease progresses, these patients may experience pain and altered QOL, as the pathology is associated with limitations and a high degree of disability, causing absence from work, decreased productivity, and difficulty in carrying out the activities of daily life.[8-9] Neuropathic pain was present in approximately 18.0% of participants in a study carried out with individuals with DM2 in Spain.[5] In Brazil, it varies between 19.1% and 58% depending on the location and method of diagnosis of patients with DN.[9-10] Also, neuropathic pain can become chronic and disabling and its triggered symptoms often do not respond to therapy, which further affects the patient's QOL, which may lead to social isolation and depression.[5,11]

For this reason, studies show that, among patients with DM2 who suffer from chronic complications, there is a demonstration of lower QOL than those who do not have DM2.[12-13] Microvascular complications, specifically, have a higher prevalence and promote high rates of hospitalization, non-traumatic amputations, and disability.[5,10] Researchers point out that microvascular complications are significantly associated with a worse QOL than macrovascular complications.[2,11-12]

Thus, QOL and pain have been investigated in DM2 patients using several instruments.[11-15] However, the investigation of pain using the Leeds Assessment of Neuropathic Symptoms and Signs - LANSS scale has been little used in Brazil concerning studies international.[16-20] Thus, recognizing pain with DN characteristics is important to identify DM complications, using validated instruments that help to build nursing knowledge. It is noteworthy that patients seek primary care as a gateway to the diagnosis and treatment of complications arising from DM2. Therefore, DN pain is considered a serious problem.

After the above, this study aimed to compare the pain and QOL of individuals with and without DN.

Method

This is a cross-sectional study. The survey was conducted in two Basic Health Units (UBS) in the western health region of Distrito Federal/DF, Brazil. The population of this research consisted of patients with type 2 DM registered in the aforementioned UBS.

The sample calculation considered a sampling error of 5% and a confidence interval of 95%, which added up to a final number of 251 participants. The sample selection took place at random by drawing lots according to the registration number at the UBS. Data collection took place between April and July 2017.

First, a specific day was scheduled with the randomly selected patients, by telephone, to attend the UBS, where, in a private room, we carried out all assessments. We included individuals who met the following inclusion criteria in the sample: having a diagnosis of type 2 DM ≥06 months, age ≥18 years old, being registered and following up at the UBS, being able to understand, verbalize and answer the questionnaires. We excluded from the study pregnant women, people with a medical diagnosis of mental illnesses and cancer undergoing treatment,

and those without the possibility of evaluating their feet. At first, we selected 256 patients; however, five participants were excluded because it was not possible to assess the feet due to interdigital maceration (three), mycosis (one), and erysipelas (one) of the participants. The assessment of patients was carried out through the application of structured instruments that characterized the demographic, socioeconomic, and clinical profiles, the assessment of pain with characteristics of neuropathy and QOL.

To assess pain with characteristics of DN, the presence of pain in the calves and/or foot nodes was considered, with a score ≥12 points on the LANSS Scale. The scale explores qualitative and sensory aspects of pain with scores ranging from 0 to 24 points so that a score ≥12 points indicates that neuropathic mechanisms are probably contributing to the pain.[14] Loss of Protective Sensitivity (LPS) was also investigated through the Semmes-Weinstein monofilament (10g). This was applied to the distal phalanx of the hallux in the plantar region; head of the first, third, and fifth plantar metatarsals.[2,4]

Another assessment was the measurement of pain, characterizing its prevalence, location, duration, intensity, and quality. Prevalence and duration were investigated by classification as chronic pain (pain duration greater than 6 months). The Visual Analog Scale (VAS) measured the intensity from 0 to 10 points. The intensity of pain in the feet and calves assessed by the VAS was categorized as absent (zero), mild (1 to 3 points), moderate (4 to 6 points), and severe (7 to 10 points).[4] The quality of pain was evaluated by the McGill instrument, through the use of pain descriptors, which can be referred to as: burning, numbness, tingling, fatigue, cramps, itching, pinprick, needling and others.[15]

Finally, the last assessment was the investigation of QOL using the Instrument Short-Form 6 Dimensions-Brasil-SF-6D (SF-6D). Translated and validated for Brazil, the SF-6D instrument was developed from the SF-36 questionnaire, being able to assess QOL in the following dimensions: functional capacity, global limitation, social aspects, pain, mental health, and vitality. The score of

this instrument represents the individual's preference for health status. The score ranges from 0 to 1, where 0 is the worst health status and 1 corresponds to the best health status.[16]

A database was built in the Software Package for the Social Sciences (SPSS®) version 21.0. Descriptive statistical analysis was performed by calculating absolute and relative frequencies and measures of dispersion (mean, standard deviation, minimum and maximum). The Chi-square test was used to compare proportions between groups. After the numerical variables presented normal distribution in the Kolmogorov-Smirnov test, we compared the means between the groups using the Student's t-test. We considered $p<0.05$.

Signature by all participants of the Informed Consent Form was guaranteed, following the ethical precepts of resolution 466/2012. This study was approved by the Research Ethics Committee of the Health Sciences Education and Research Foundation of the Federal District Health Department under opinion 1.355.211.

Results

The characterization of participants with DM2 showed a mean age of 58.9±10.01 years old (Min.=30 and Max.=85 years old). Women (74.5%), participants aged between 51 and 60 years old (37.8%), brown (49.8%), born in the Northeast region (56.2%), married (49.0), with elementary education (65.3%), active (35.1%), with monthly income less than or equal to 1 minimum wage (45.8%), with illness duration of fewer than 10 years (68.5 %) and with arterial hypertension (79.7%) prevailed. According to the assessment scores by the LANSS scale, 16.3% of the patients had neuropathy (Table 1).

Table 1 - Comparison of the clinical and sociodemographic profile of individuals with type 2 DM with and without neuropathy (n=251), West Region, Brasília-DF, 2017.

		LANSS pain scale						
		Total n=251		**With neuropathy** n=41		**Without neuropathy** n=210		**p**
		n	%	n	%	n	%	
Gender	Male	64	25.5	8	19.5	56	26.7	0.336
	Female	187	74.5	33	80.5	154	73.3	
Age	30 and 40 years old	7	2.8	3	7.3	4	1.9	0.753
	41 and 50 years old	47	18.7	10	24.4	37	17.6	
	51 and 60 years old	95	37.8	14	34.1	81	38.6	
	61 and 70 years old	67	26.7	9	22	58	27.6	
	≥71 years old	35	13.9	5	12.2	30	14.3	
Skin Color	White	70	27.9	8	19.5	62	29.5	0.228
	Brown	125	49.8	20	48.8	105	50	
	Black	47	18.7	12	29.3	35	16.7	
	Others	9	3.6	1	2.4	8	3.8	
Origin	North	8	3.2	3	7.3	5	2.4	0.343
	Northeast	141	56.2	19	46.3	122	58.1	
	Midwest	56	22.3	10	24.4	46	21.9	
	Southeast	44	17.5	9	22	35	16.7	
Marital status	Single	51	20.3	8	19.5	43	205	0.065
	Married	123	49.0	19	46.3	104	49.5	
	Divorced	37	14.7	11	26.8	26	12.4	
	Widower	40	15.9	3	7.3	37	17.6	
Education level	Illiterate	13	5.2	3	7.3	10	4.8	0.644
	Elementary school	164	65.3	24	58.5	140	66.7	
	High school	67	26.7	12	29.3	55	26.2	
	Higher education	7	2.8	2	4.9	5	2.4	
Activity status	Active	88	35.1	16	39	72	34.3	0.974
	Retired	60	23.9	10	24.4	50	23.8	
	ON leave	8	3.2	1	2.4	7	3.3	
	Unemployed	81	32.3	12	29.3	69	32.9	
	Without answer	14	5.6	2	4.9	12	5.7	
Minimum wage	≤1MW*	115	45.8	20	48.8	95	45.2	0.341
	2 to 3 MW*	95	37.8	18	43.9	77	36.7	
	4 to 5 MW*	23	9.2	1	2.4	22	10.5	
	6 or more MW*	18	7.2	2	4.9	16	7.6	
DM time †	< 10 years	172	68.5	31	75.6	141	67.1	0.542
	> 10 years	66	26.3	8	19.5	58	27.6	
	They do not know	13	5.2	2	4.9	11	5.2	
Comorbidity	SAH‡	200	79.7	35	85.4	165	78.6	0.356
	Others	3	1.2	1	2.4	2	1	
	None	48	19.1	5	12.2	43	20.5	

*Minimum wage: MW (R$ 937.00) in 2017; †DM: diabetes mellitus; ‡SAH: systemic arterial hypertension.

The prevalence of pain was 97.6%, emphasizing that all patients with neuropathy reported pain. As for the location of the main pain, 35.1% reported pain in the lower limbs and 83.3% claimed pain in the feet or calves so that 90.2% of neuropathic patients complained of this involvement. Most participants had chronic pain. A greater number of patients with neuropathy reported waking up at night frequently and continuously due to pain when compared to the group without neuropathy (p=0.000). The pain was described as severe by most participants (Table 2).

The mean pain of the group with neuropathy (M=7.15±2.0; Min=0; Max=10) was significantly higher than the group without neuropathy (M=6.4±2.3; Min= 0; Max=10) (p=0.038).

Table 2 - Comparison of pain assessment regarding prevalence, location, duration, intensity, and quality in individuals with type 2 DM with and without neuropathy (n=251) West Region, Brasília-DF, 2017.

		LANSS pain scale						
		Total n=251		**With neuropathy** n=41		**Without neuropathy** n=210		p
		n	%	n	%	n	%	
Presence of pain	Yes	245	97.6	41	100	204	97.1	0.273
	No	6	2.4	--	--	6	2.9	
Main location	*LL	88	35.1	15	36.6	73	34.8	
	†UL	23	9.2	3	7.3	20	9.5	
	Dorsal region	53	21.1	9	22	44	21	
	Ventral region	8	3.2	1	2.4	7	3.3	0.509
	Cephalic region	13	5.2	--	--	13	6.2	
	More than one location	60	23.9	13	31.7	47	22.4	
	Absence of pain	6	2.4	--	--	6	2.9	
Time of pain	<6 months	32	12.7	3	7.3	29	13.8	
	>6 months	213	84.9	38	92.7	175	83.3	0.265
	Absence of pain	6	2.4	--	--	6	2.9	
Foot or calf pain	Yes	209	83.3	37	90.2	172	81.9	0.191
	No	42	16.7	4	9.8	38	18.1	
Awake due to pain	Never	116	46.2	6	14.6	110	52.4	
	Sometimes	70	27.9	15	36.6	55	26.2	
	Frequently	43	17.1	15	36.6	28	13.3	**0.000**

	Continuously	16	6.4	5	12.2	11	5.2	
	Absence of pain	6	2.4	--	--	6	2.9	
[‡]AVS	Absent	43	16	4	9.8	38	18.1	
	Mild	9	4.3	--	--	9	4.3	
	Moderate	85	33.9	12	29.3	73	34.8	0.118
	Severe	115	45.8	25	61	90	42.9	

*LL: lower limbs; †UL: upper limbs; ‡AVS: Analogic visual scale.

In the assessment of the feet by LPS, we observed that most individuals in the neuropathy group presented alterations in the 10g monofilament test (p=0.001). Regarding the quality of pain, the main descriptors mentioned were: fatigue, burning, cramping, and pinprick, and/or needling. Among those with neuropathy, the most reported compared to those without neuropathy were: burning (p=0.004), tingling (p=0.002), and pinprick and/or needling (p=0.003) (Table 3).

Table 3 – Comparison of pain assessment using the McGill Scale, loss of plantar protective sensitivity (LPS) test, and neuropathic pain descriptors of individuals with type 2 DM with and without neuropathy (n=251), Western Region, Brasília-DF, 2017.

	LANSS pain scale						
	Total n=251		**With neuropathy** n=41		**Without neuropathy** n=41		p
	n	%	n	%	n	%	
Altered LPS*	75	29.9	21	51.2	54	25.7	**0.001**
Pain descriptors							
Burning	80	31.9	19	46.3	61	29	**0.004**
Numbness	62	24.7	15	36.6	47	22.4	0.109
Tingling	53	21.1	17	41.5	36	17.1	**0.002**
Fatigue	112	44.6	15	36.6	97	46.2	0.082
Cramping	79	31.5	15	36.6	64	30.5	0.394
Itching	24	9.6	7	17.1	17	8.1	0.115
Pinprink and/or needling	64	25.5	17	41.5	47	22.4	**0.03**
Others	7	2.8	1	2.4	6	2.9	0.412

*LPS- loss of protective plantar sensitivity

Regarding the assessment of QOL, the general QOL index using the SF6D instrument had an average of 0.78, so that patients with neuropathy had a lower score, but there was no difference between the groups (p>0.05). We observed that, in general, the pain domain was the

most affected among the participants, followed by vitality and mental health. The least affected domain was the social aspect, although there was no difference between the study groups (p>0.05) (Table 4).

Table 4 – Comparison of altered quality of life domains of individuals with type 2 DM with and without neuropathy (n=251), Western Region, Brasília-DF, 2017.

	Total n=251		**LANSS pain scale**				p
			With neuropathy n=41		**Without neuropathy** n=210		
	n	%	n	%	n	%	
Functional capacity	161	64.1	31	75.6	130	61.9	0.094
global limitation	152	60.5	27	65.9	125	59.5	0.448
Social aspects	124	49.4	22	53.7	102	48.6	0.551
Pain	229	91.2	40	97.6	189	90.0	0.117
Mental health	187	74.5	35	85.4	152	72.4	0.081
Vitality	200	79.6	33	80.5	167	80.0	0.881
EGQV-SF6D* (†M±SD‡)	0.78±0.09		0.77±0.06		0.79±0.10		0.090

* SF6D General Quality of Life Score (EGQV-SF6D): †Mean (M), ‡Standard Deviation (SD)

Discussion

Regarding the sociodemographic profile, the prevalence of females in this research is a fact observed in other studies carried out among individuals with DM.[2,11] Most patients were married and were aged between 51 and 60 years old. The presence of the partner/spouse influences the family dynamics and the self-care process of patients with DM, which can contribute to this help process.[3,5] Other studies with the same population showed similar profiles in age and marital status.[7-8,10]

In this study, there was also a prevalence of older people with low education and income, which reflects the socioeconomic deprivation of the population studied. Even so, the results of some researches corroborate these data.[11-12] The level of education when related to health is a relevant factor since individuals with few years of school have a greater tendency to understand less about the disease and treatment, and the consequences of inadequate control.[6,11]

DM2 is usually associated with some type of comorbidity, with Systemic Arterial Hypertension (SAH) being one of the most frequent, a fact observed in this study.[4] This should be considered since the association between DM2 and SAH adds greater risks in the development of chronic complications of DM2 and increased morbidity and mortality from cardiovascular diseases.[2]

However, in addition to SAH, other conditions are also risk factors for the development of DN, as well as advanced age, constant hyperglycemia, hypertriglyceridemia, male gender, longer DM time, glycosylated hemoglobin (HbA1C) greater than 7%, insulin therapy, dyslipidemia, albuminuria, and obesity.[2,4,12] These factors maintain the oxidative stress cycle, promote inflammatory signals, cause cell damage and result in the acceleration of the development of DN.[10]

As explained above, inadequate glycemic control is one of the triggering factors for the development of DN. Hyperglycemia reduces the ability to eliminate free radicals, causing impairment of neuronal metabolism and dysfunction of nerve fibers, which consequently decreases the conduction speed.[2,10] Authors claim that effective metabolic control reduces the risk of complications.[11] Even in the short term, this control can improve both the metabolic changes in glucose and lipids and the vibratory sensitivity reported by these patients.[12-13]

The longer time of DM diagnosis is another factor that increases the risks for the development of complications. In this study, individuals with DM, with diagnosis time of up to 10 years prevailed. Other studies had similar results, ranging from 9 to 14 years.[11,20-21] However, some investigations showed superior findings with an average time greater than 15 years.[12-13,17] Researchers also state that DN occurs mainly after the first 10 years of living with the disease.[2,13,18]

Thus, the nursing team should work on health education regarding glycemic control, due to the existence of evidence that, during pre-diabetes, DN can already occur.[6] The nurse should encourage persistent glycemic control aimed at preventing and/or delaying the complication of DM2.

The results of this study demonstrated a prevalence of DN similar to those found by other authors.[19-21] In international surveys in North America, the prevalence of DN was approximated

to the present study.[12-13] In Africa, among 252 DM patients evaluated, the prevalence of DN was 18.0%.[22] In an investigation carried out in Brazil, a prevalence of DN of 34.1% was identified.[17] However, in individuals diagnosed with DM with 10 years, this number may be higher.[1-2,5,12-13,17,23]

A considerable issue facing DN is the difficulty of early diagnosis. It is common that, upon discovering DM, the patient already has the disease at an advanced stage, often with complications or even DN. For this reason, the early investigation of DM is essential to delay other associated problems.[2] Once it is known that the patient has DM, the nurse has an indispensable role in the success of the treatment and the prevention of complications. The Ministry of Health recommends that nurses should carry out nursing consultations since DN can be painful and not painful.[4]

When the patient evolves with DN without the presence of pain, it can have as serious consequences the insensitivity of the feet, formation of a diabetic foot ulcer (DU), amputation, and early mortality. Nurses must recognize individuals at risk, carry out an assessment of the feet and guide care to prevent and screen early cases of DN.[4,17,24] These measures enabled for care provided in primary care to include the assessment of LPS, a characteristic of the development of neuropathy, the importance of self-care and daily foot care.[2,4]

Regarding the tracking of DN through the assessment of the feet, the Brazilian Society of Diabetes recommends researching the plantar LPS through the 10g monofilament test and sensory tests. When there is insensitivity to the monofilament and one or more sensory-motor tests (vibratory sensitivity, pain, and Achilles reflex), LPS is present. The Semmes-Weinstein monofilament is recommended for use because it demonstrates high specificity in the diagnosis of DN, in addition to its ease of use and cost-effectiveness.[2,24] In particular, in the assessment of neuropathic pain, using the LANSS scale, the toothpick, and in LPS, measures of evaluation and characterization of neuropathic pain are also used in the assessment of pain sensitivity.[2,4]

In this sense, due to the lack of confirmatory neuron conduction equipment in primary care and the high specificity and cost-benefit ratio, this research tracked the possible diagnosis of neuropathy through the assessment of tactile sensitivity (10g monofilament) and of the LANSS pain scale, which recognizes whether neuropathic mechanisms contribute to referred pain.[2,4,16] When electrophysiological tests such as electromyography and evoked potentials are used for diagnosis, early involvement of the nervous system is verified, which can get close to 100%.[2,5]

In this study, in the evaluation of the monofilament, one-third of the participants had the test changed. DN affects the nerve fibers of the peripheral nervous system, especially the lower limbs.[9] The impairment is diffuse, symmetrical, and distal, and clinically, when symptomatic, it courses with positive sensory symptoms, that is, it presents an excessive response to a stimulus or spontaneous sensations, such as paresthesia, burning, tingling, and pain.[16,20] Or even negative sensory symptoms, that is, reduced response to a given stimulus, for example, numbness and loss of sensation in affected limbs.2,10 The striking feature of these symptoms is the report of nocturnal exacerbation.[4] We observed this fact in this study, as they often rose at night due to pain. The results of the research carried out in Teresina were similar.[25]

In this study, almost all patients reported pain, most of them with pain in the feet or calves. Some researchers affirm that one in five individuals with DM has neuropathic pain.[2,5] Others claim that 13 to 21% of neuropathic patients have pain.[26-27] Research such as this one has confirmed these claims and presented a DN frequency between 16.7 and 75.0% of the patients evaluated.[7,23]

The main pain descriptors were fatigue, burning, cramp, and numbness. Experts describe neuropathic pain in individuals with DM as pricking, intense burning, shock, burning, fatigue, stabbing pain, paresthesia, numbness, and cramps.[5,10] In other studies to assess painful neuropathy, the most common descriptors are burning, tingling or numbness.[19,25-27] Also, some patients describe imbalance, falls, shock, pricking, needling, as well as discomfort or pain when touching sheets and blankets and worsening at rest.[5]

In this investigation, moderate and severe pain was prevalent between the groups. In a survey carried out in Spain to analyze the painful DN and DN of 130 individuals, 50.0% of neuropathic patients reported moderate pain.[27] On the other hand, DN can also develop asymptomatically due to the loss of total sensitivity.[2,4,28-29] This loss of sensitivity added to the absence of pain should be carefully considered by the nursing staff, as they are patients at risk for lower limb injuries.

Patients with painful DN live with intense pain and it becomes chronic, harming their daily lives and their mood.[2] Pain assessment should be part of nurses' routine, both in the investigation of intensity and duration, and mainly in the quality describing the pain of DN (burning, fatigue and numbness).[11,16] These descriptors are of neuropathic origin and show the nurse's responsibility to draw a care plan to control pain and reduce impacts physical and emotional aspects in the lives of patients with DM2. Chronic pain requires drug therapy and action by an interdisciplinary team (physician, nurse, and pharmacist), especially in primary care.

Added to painful symptoms, there may be a high incidence of falls, depression, limitations, functional disability, and decreased survival. The Brazilian Diabetes Society considers neuropathy a public health problem that directly affects the QOL of patients.[2] Authors reveal that most cases with sequelae related to chronic complications of DM have a lower QOL when compared to those who are not affected by complications.[5,22,25]

In this research, the mean QOL score, using the SF6D, was similar to another recent study (mean = 0.85).[8] Authors state the usefulness of this instrument in the assessment of QOL in primary care[7] because it is quick, easy, reliability and certified reproducibility.[8,14,16]

In another investigation with 756 individuals with DM, the dimension of QOL most impaired by the SF12D questionnaire was general health, physical status, and mental health.[26] A survey conducted in Montes Claros with 201 older people aimed to assess the impact of time of DM diagnosis on the QOL of older people cared for in UBS, through the SF-36. The results

showed that the duration of DM for more than 10 years negatively influenced the QOL of older adults, especially in functional capacity, vitality, and mental health. Increased pain intensity and greater physical and emotional limitation in older people can be considered the most influential factors in reducing QOL.[30]

In this study, the most affected domains were pain, vitality, mental health, and functional capacity. Also, in agreement with these findings, another investigation carried out in Porto Alegre with 211 primary care patients showed that the pain and vitality domains significantly contribute to a reduction in the population's QoL.[8] In Canada, a survey identified that DM causes harm to QOL, especially in the physical and mental domains.[29]

Due to the symptoms of pain, painful DN harms the QOL of individuals with DM related to changes caused in recreational and social activities, and also in issues related to work and mobility. In addition, pain treatment requires the use of medications and complementary care that demand peculiar financial, social, and educational resources, often inaccessible.[2,4,12]

In addition to losses in the pain domain, the participants in this research also had losses in other QOL domains. Therefore, the negative impacts generated by DM2 are not restricted to neuropathy, but also to changes in lifestyle due to therapy, side effects of medications, concerns about the chronicity of the disease, costs with issues related to the disease, in addition to social and family support.[1,23,29]

We believe that the results of this research bring relevant contributions to nursing, as they can favor care in primary care, encouraging the use of standardized scales, such as pain characterization and the LANSS scale, which can quickly identify patients who have pain with ND features. These results can also guide and improve nursing assessment in people living with chronic conditions such as DM. The limitation of this study was the cross-sectional design, which does not allow the establishment of cause-and-effect relationships. In addition, variables such as cholesterol, triglycerides, glycated hemoglobin, and blood glucose were not investigated.

Conclusion

The study showed that most patients with neuropathy experience severe pain, which causes them to wake up at night due to this pain. Mean pain intensity was significantly higher in the neuropathy group. The main affected QOL domains of patients with neuropathy were: pain, vitality, mental health, and functional capacity. We observed that the profile of non-neuropathic patients is similar to neuropathic patients, but those with neuropathy report burning, tingling and pinprick, and/or needling pain.

Therefore, care aimed at preventing DN and promoting the QOL of these patients is needed, such as early tracking of pain with DN characteristics, added to the assessment of the feet, changes in lifestyle habits, changes in eating patterns, adequate glycemic control, physical activity practice, DM2 control and continuous monitoring by the nursing staff in primary care.

References

1. International Diabetes Federation (IDF). IDF Diabetes Atlas. 9th edition 2019 [Internet]. Brussels: International Diabetes Federation; 2019 [cited 2020 Dec 12]. Available from: http://www.diabetesatlas.org/

2. Sociedade Brasileira de Diabetes (SBD). Diretrizes da Sociedade Brasileira de Diabetes (2019-2020) [Internet]. São Paulo: Clammad; 2019 [acesso em 2020 dez 12]. Disponível em: https://www.diabetes.org.br/profissionais/images/DIRETRIZES-COMPLETA-2019-2020.pdf

3. Côrrea K, Gouvêa GR, Silva MAV, Possobon RF, Barbosa LFLN, Pereira AC, et al. Qualidade de vida e característica de pacientes diabéticos. Ciênc Saúde Colet. 2017;22(3):921-30. doi: 10.1590/1413-81232017223.24452015

4. Ministério da Saúde (BR). Manual do pé diabético: estratégias para o cuidado da pessoa com doença crônica [Internet]. Brasília (DF): Ministério da Saúde; 2016 [acesso em 2020 dez 12]. Disponível em: http://189.28.128.100/dab/docs/portaldab/publicacoes/manual_do_pe_diabetico.pdf

5. Shillo P, Sloan G, Greig M, Hunt L, Selvarajah D, Elliott J, et al. Painless and painless diabetic neuropathies: what's the difference? Curr Diab Rep. 2019;19(6):27-32. doi: 10.1007/s11892-019-1150-5

6. Grisold A, Callaghan BC, Feldman EL. Mediators of diabetic neuropathy: is hyperglycemia the only culprit? Curr Opin Endocrinol Diabetes Obes. 2017;24(2):103-11. doi: 10.1097/MED.0000000000000320

7. Jiao F, Wong CKH, Gangwani R, Tan KCB, Tang SCW, Lam CLK. Health-related quality of life and health preference of Chinese patients with diabetes mellitus managed in primary care and secondary

care setting: decrements associated with individual complication and number of complications. Health Qual Life Outcomes. 2017;15(1):125. doi: 10.1186/s12955-017-0699-4

8. Berwanger DD, Filippin LI, Saldanha RP. SF-6D como uma medida rápida de qualidade de vida: um estudo descritivo na atenção básica de saúde. Rev Inspirar [Internet]. 2016 [acesso em 2020 dez 12];11(4):20-6. Disponível em: https://www.inspirar.com.br/wp-content/uploads/2016/12/artigo3-sf-6d-.pdf

9. Silva REG, Morais ACS, Godoi CD, Garcia OAG, Rabelo Neto WN. Avaliação sensório-motora e sua correlação com qualidade de vida em portadores de diabetes mellitus. South Am J Basic Educ Tech Technol [Internet]. 2017 [cited 2020 Dec 12];4(1):118-32. Available from: https://periodicos.ufac.br/index.php/SAJEBTT/article/view/1140

10. Sociedade Brasileira de Diabetes (SBD). Neuropatia diabética: posicionamento da Associação Americana de Diabetes [Internet]. São Paulo: Sociedade Brasileira de Diabetes; 2019 [acesso em 2020 dez 12]; Disponível em: https://www.diabetes.org.br/profissionais/images/2019/posicionamento2019/Posicionamento-Neuropatia-Diabetica-SBD.pdf

11. Lima LR, Stival MM, Funghetto SS, Volpe CRG, Rehem TCMSB, Santos WS, et al. Lower quality of life, lower limb pain with neuropathic characteristics, female sex, and ineffective metabolic control are predictors of depressive symptoms in patients with type 2 diabetes mellitus treated in primary care. Int J Diabetes Develop Ctries. 2018;39(6):463-70. doi: 10.1007/s13410-018-0667-5

12. Liu X, Xu Y, An M, Zeng Q. The risk factors for diabetic peripheral neuropathy: a meta-analysis. PLoS One. 2019 Feb 20;14(2):e0212574. doi: 10.1371/journal.pone.0212574

13. Girach A, Julian TH, Varrassi G, Paladini A, Vadalouka A, Zis P. Quality of life in painful peripheral neuropathies: a systematic review. Pain Res Manag. 2019:2091960. doi: 10.1155/2019/2091960

14. Schestatsky P, Félix-Torres V, Chaves MLF, Câmara-Ehlers B, Mucenic T, Caumo W, et al. Brazilian Portuguese validation of the leeds assessment of neuropathic symptoms and signs for patients with chronic pain. Pain Med. 2011 Oct;12(10):1544-50. doi:10.1111/j.1526-4637.2011.01221.x

15. Pimenta CAM, Teixeira MJ. Questionário de dor McGill: proposta de adaptação para a língua portuguesa. Rev Esc Enferm USP. 1996;30(3):473-83. doi: 10.1590/S0080-62341996000300009

16. Campolina AG, Bortoluzzo AB, Ferraz MB, Ciconelli RM. Validação da versão brasileira do questionário genérico de qualidade de vida short-form 6 dimensions (SF-6D Brasil). Ciênc Saúde Colet. 2011;16(7):3103-10. https://doi.org/10.1590/S1413-81232011000800010

17. Aguiar FLXS, Ramos LFP, Bichara CNC. Detecção de dor com características neuropáticas em pacientes com diabetes mellitus atendidos na atenção básica. BrJP. 2018;1(1):15-20. doi: 10.5935/2595-0118.20180005

18. Isomura T, Sumitani M, Matsudaira K, Kawaguchi M, Inoue R, Hozumi J, et al. Development of the Japanese version of the leeds assessment of the neuropathic symptoms and signs pain scale: diagnostic utility in a clinical setting. Pain Pract. 2017;17(6):800-7. doi: 10.1111/papr.12528

19. Say B, Ergün U, Yıldız A, Alpua M, Arıkan Durmaz Ş, Turgal E. Detection of pain severity with the full cup test in painful diabetic peripheral neuropathy. Agri. 2020 Apr;32(2):85-90. doi: 10.14744 agri.2019.82653

20. Cevik AB, Olgun N. The predictors of painful diabetic neuropathy and its effect on quality of life. Pain Manag Nurs. 2021;S1524-9042(21):00126-0. doi: 10.1016/j.pmn.2021.04.002

21. Ponirakis G, Elhadd T, Chinnaiyan S, Dabbous Z, Siddiqui M, Al-Muhannadi H, et al. Prevalence and risk factors for painful diabetic neuropathy in secondary healthcare in Qatar. J Diabetes Investig. 2019;10(6):1558-64. doi: 10.1111/jdi.13037

22. Maiga Y, Diallo S, Konipo FDN, Sangho O, Sangaré M, Diallo SH, et al. Diabetic polyneuropathy with/out neuropathic pain in Mali: a cross-sectional study in two reference diabetes treatment centers in Bamako (Mali), West Africa. PLoS One. 2020;15(11):e0241387. doi: 10.1371/journal.pone.0241387

23. Dutra LMA, Moura MC, Prado FA, Lima GO, Melo MC, Fernandez RNM, et al. Is it possible to substitute the monofilament test for the Ipswich Touch Test in screening for peripheral diabetic neuropathy? Diabetol Metab Syndr. 2020;12(27):1-6. doi: 10.1186/s13098-020-00534-2

24. Feitosa TF, Dantas MQS, Silva CB, Pereira A. Monofilament for preventing the diabetic foot: an integrative review of the literature. Online Braz J Nurs. 2016;15(2):291-301. doi: 10.17665/1676-4285.20165277

25. Naranjo C, Ortega-Jiménez P, Del Reguero L, Moratalla G, Failde I. Relationship between diabetic neuropathic pain and comorbidity. Their impact on pain intensity, diabetes complications and quality of life in patients with type-2 diabetes mellitus. Diabetes Res Clin Pract. 2020;165(6):e108236. doi: 10.1016/j.diabres.2020.108236

26. Silveira IA, Oliveira BGRB, Oliveira AP, Andrade NC. Padrão da dor de pacientes com úlcera de pernas. Rev Enferm UFPE On Line [Internet]. 2017 [cited 2020 Dec 12];11(2):617-24. Available from: https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/11981/14537

27. Pop-Busui R, Boulton AJ, Feldman EL, Bril V, Freeman R, Malik RA, et al. Diabetic neuropathy: a position statement by the American Diabetes Association. Diabetes Care. 2017;40(1):136-54. doi: 10.2337/dc16-2042

28. Lima LR, Stival MM, Funghetto SS, Silva ICR, Rehem TCMSB, Santos WS, et al. Neuropatia e dor nos membros inferiores: sinais percussores do pé diabético. In: Parisi MCR, Leite CR, Rosa MFF. Interdisciplinaridade no contexto das doenças dos pés no diabetes: tratamento clínicos, políticas públicas e tecnologias em saúde. 1ª ed. Mossoró: EDUERN. 2021.

29. Feldman EL, Callaghan BC, Pop-Busui R, Zochodne DW, Wright DE, Bennett DL, et al. Diabetic neuropathy. Nat Rev Dis Primers. 2019 Jun 13;5(1):42. doi: 10.1038/s41572-019-0092-1

30. Matias COF, Matias COF, Alencar BA. Qualidade de vida em idosos portadores de Diabetes Mellitus Tipo 2 atendidos em Unidades Básicas de Saúde de Montes Claros/MG. Rev Bras Qual Vida. 2016;8(2):119-29. doi: 10.3895/rbqv.v8n2.3841

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