121 - EVALUATION OF THE FEET IN DIABETIC INDIVIDUALS AND THE LEVEL OF PERIPHERAL NEUROPATHY

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Introduction

The Diabetes Mellitus (DM) is an important problem of public health and can be associated with complications, which are responsible for expressive costs in health, besides the substantial reduction of capacity of work, of quality of life and of life expectancy. Preventative ,measures of DM, as well as it's complications are effective to reduce the unfavorable impact that the illness and death provoke to the carriers and his/her relatives (MARTINS, 2000).

The foot truly reflects all the damages caused by the illness: vasculopathies, chronic motor-sensitive neuropathies, deformities and infections. Therefore, the "diabetic foot" can be defined as an infection, ulceration and/or destruction of profound tissues associated with neurological abnormalities and various levels pf peripheral vascular disease in the inferior limb. It is one of the most threatening chronic complications of DM, considering it's incapacitating, recurrent and expensive factors for the individual and the health system (LACERDA, 1988).

The assessment of the levels of sensibility in the feet is fundamental for the diabetics once that the majority of these individuals do not know such alterations. It is indispensable to alert the patients that the abnormal sensibility of the feet can have consequences like ulcers, deformities, postural alterations besides the great risk of amputation (MARTINS, 2000).

Quoting Perkins :(2001), currently not one specific medicine demonstrated to revert the neuropathy or prevent the progression of illness, except the intervention to aware the individuals of the importance of glycolic control. Therefore, the care taken with the foot can be improved and reduce the risk of complications in inferior extremities.

According to Lima, Schmidt (1996) the history and physical examination constitute the simple, effecting and right form for identification of the peripheral neuropathy and/or identification of the feet in risk to develop it.

Peripheral Neuropathy (PN) is the term used to describe the neurological disturbance clinically demonstrated or for diagnostic methods, which affect the diabetic patients without others, causes of neuropathy. Among the chronic complications of DM, the compromise of the peripheral nervous system is unquestionably one of the most frequent manifestations, affecting more than half of the type 2 diabetic patients and in less proportion those with type 1 DM (VILAR et al., 2001).

Therefore, this study aimed to verify the sensibility and the level of PN in a type 2 diabetes affected group.

Methods and Material

Initially this study was submitted and approved by the Committee of Ethics and Research in Human Beings of UDESC.

The first step characterized by the visit of the diabetic groups of the city of Florianópolis in which was selected the participants with average age between 40 and 64 years of age with diabetes type 2. The term of free contentment and enlightenment was presented and personal data and characteristics of each participant of the study were collected. These information is shown in table 1.

Table 1 - Description of participants

Individual	Age	Gender	Weight	Practitioner of Physical activity
1	60	F	67,8	No
2	54	M	71,1	Yes
3	62	M	61,8	Yes
4	55	F	62,9	No
5	59	F	67,1	Yes
6	58	F	66,0	Yes
7	53	F	65,7	Yes

Labels: F= female, M= male

It was observed that: 5 individuals studied were of female gender and 2 of male gender; the average age was of 57,29 (3,10) years, the mean mass between the studied sample was of 66,07 (2,87) Kg, 5 individuals practiced regular physical activity (at least 3 times per week) and 2 individuals did not practice.

After, the sensibility tests were carried out and the Toronto scale was applied in the participants that presented any sensitive alteration in the feet.

The utilized instruments for the assessment of the feet were:

· Monofilaments of 10g, which can be in figure 1, used to assess the somestesic sensibility (CAVANAGH, ULBRETCH, CAPUTO, 2000);

· Neurological Hammer: to test the patellar and achilles reflexes, according to figure 1 (ERWIN GUTH, 2006);

· Diapason of 128 Hz to test the vibratory sensibility (illustrated in figure 1). Initially the instrument was applied on the sternum for the patient refers the nature of perceived sensation. Soon after, a constant pressure was perpendicularly applied on the dorsal bone part of the distal halux phalange in both feet, close to the beginning of the nail.

· Scale: for the measuring of the body mass.



Figure 1: Diapason, Monofilament of 10g, Neurological Hammer

The sensibility of the feet was verified through somestesic sensation with the monofilaments of 10g in 5 different areas of the feet, according to figure 2.

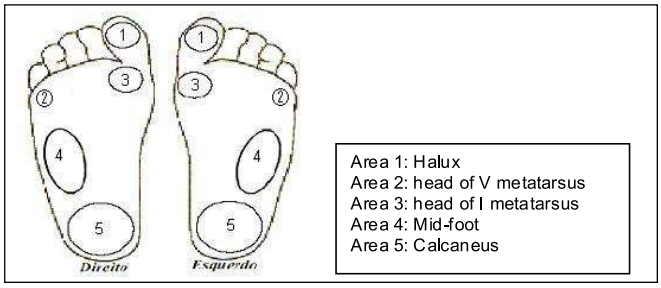

Figure 2 - Areas of realization of somestesic sensibility tests
Source: Cavanagh, Ulbretch, Caputo (2000).

After undertaking the assessment of the feet, the severity of the peripheral neuropathy was classified according to Toronto scale for Polyneuropathy Diabetic (Toronto Clinical Scoring System for Daibetic Polyneuropathy), which constitute of a simple numeric score to assist in the diagnosis of peripheral neuropathy (PERKINS, BRIL, 2003). Consists in:

a) Questioning the participants on the presence or the absence of pain in the feet, of sensibility, of thermal sensation, of muscular weaknesses and of similar symptoms in the lower limb, which were graduated totalizing 6 scores (according Board 1).

Pain	Sensibility	Thermal sensation	Muscular weaknesses	Imbalance	Similar symptoms in lower limbs
Presence = 1 Absence = 0	Presence = 0 Absence = 1	Presence = 0 Absence = 1	Presence = 1 Absence = 0	Presence = 1 Absence = 0	Presence = 1 Absence = 0

Board 1 - Scores related to the symptoms of the individual

b) Tests of achillis and patellar reflexes in both inferior limbs that will be graduated as: absent, reduced or normal, according to board 1, totalizing in 8 scores.

Achillis Reflex	Patellar Reflex
Absent = 2	Absent = 2
Reduced = 1	Reduced = 1
Normal = 0	Normal = 0

Board 2 - Scores related to the profound reflexes
Source: Perkins, Bril (2002).

c) Physical exam realization: it was observed the presence or the absence of sensibility promoted by mechanical stimulus (like the monofilaments), thermal, touching, vibratory and proprioceptive, adding 5 scores, according to board 3.

Mechanics	Thermal	Touching	Vibratories	Proprioceptives
esence = 0	Presence = 0	Presence = 0	Presence = 0	Presence = 0
bsence = 1	Absence = 1	Absence = 1	Absence = 1	Absence = 1

Board 3 - Scores related to the physical exam
Source: Pekins, Bril (2002).

The total are 19 possible scores, which serve as base to divide in the following strata (PERKINS et al., 2001):
a) total 5 indicates that there is no neuropathy;
b) total of 6-8 indicates a light neuropathy;
c) total of 9-11 indicates moderate neuropathy;
d) total 12 indicates severe neuropathy.

Presentation and Discussion of the Results

The initial evaluation constituted of analysis of the feet of diabetic individuals during the visits to the respective groups. The regions with loss of sensibility are marked in the table 2.

Table 2 - Sole regions with loss of sensibility

ndividuals	Calcaneus		Mid-foot		1o. metatarsus		5o. Metatarsus		Halux	
	L foot	R foot	L foot	R foot	L foot	R foot	L foot	R foot	L foot	R foot
1	X					X				
2	X	X			X	X	X	X	X	X
3						X		X	X	X
4	X	X	X	X	X	X	X	X	X	X
5	X	X	X		X	X	X	X	X	X
6	X				X				X	X
7	X	X			X	X			X	X

Labels: "X" represents the locations where there was loss of sensibility; L foot - Left foot; R foot- Right Foot

It was observed that all the individuals studied presented loss of sensibility in some region of the sole of the feet, according to table above, being that prevalent regions with alterations of sensibility: halux, first metatarsus and calcaneus.

In a study done by Herber (2005), in which participated 31 individuals, the general objective was to assess the sensibility of the feet of healthy adults through the monofilaments of 0,2g. It was observed that areas with loss of sensibility were: calcaneus, first metatarsus, fifth metatarsus and halux. The similarities of these results can be justified between healthy individuals and carriers of DM due to the biggest pressure found in these areas of sole support that, according to Kapanji (2000), are: first metatarsus, fifth metatarsus and heel.

Kumar (1991) apud Mayfield, Segarman (2000) and Armstrong (1999) apud Ochoa-Vigo (2005) affirm that the areas

of loss of sensibility are specific to each individuals, having a great variation from individual to individual, because the life habits and the care with the feet are determining factors for this.

The stratification of the participants of this study was realized through the Toronto scale, commented before. According to Perkins, Bril (2002), this scale is extremely useful and practical to stratify individuals with peripheral neuropathy. The levels of neuropathy of each participant are demonstrated in table 3.

Table 3 - Levels of Neuropathy

Individuals	Level of Neuropathy	Classification
1	6	Light neuropathy
2	12	Severe neuropathy
3	5	Light neuropathy
4	9	Moderate neuropathy
5	9	Moderate neuropathy
6	9	Moderate neuropathy
7	12	Severe neuropathy

According to the data presented in table 3 it is noticed that 5 of the 7 studied participants had moderate to severe neuropathy, indicating a greater risk to develop ulcerations (VEVES, 1992; BLOOMGARDEN, 2005).

It is known that systems of clinical scores, like the Toronto scale, have been developed to put together a big volume of information about the clinical and neurological history of scientific research participants, and in this way, can quantify and relate theses data with other studies that use the same instruments and scales, becoming easier and truly the researches in this subject (PERKINS, BRIL, 2003).

Therefore, it is not justified to compare the data obtained with other studies because this scale was utilized only to stratify the participants and facilitate the data analysis.

Final Considerations

After the analysis of the results could be observed that the participants presented peripheral neuropathy of moderate to severe level, indicating a high risk to develop complications.

The preventive measures are essential in the assistance of peripheral neuropathy. The control of DM, the orientations to avoid ulcerations through proper care with the feet and regular visits to the doctor, as well as collaborations from the patients and the relatives and essential in the prevention of incapacities and deformities of the diabetic foot. Moreover, it is important for the diabetic to know that a simple deficiency of sensibility in the feet can increase the risk of falls and secondary complications of this disease adding to the diminishing of quality and expectance of life.

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EVALUATION OF THE FEET IN DIABETIC INDIVIDUALS AND THE LEVEL OF PERIPHERAL NEUROPATHY

Summary: The Diabetes Mellitus (DM) is an important problem with public health and can be associated with complications. The feet constitute a big factor inside the chronic complications that a diabetic is exposed to and deserves special attention, since they present a great potential to produce incapacity. The present study was realized with seven cases of diabetes type 2 through clinical assessment of the feet in which was evaluated the sole sensibility and the level of peripheral neuropathy. The results demonstrated that all the participants had areas of loss of sensibility and that the level of neuropathy varied from light to severe. These individuals lack of basic information for the prevention of injuries, care with the feet and need a better orientation by the health professionals.

Key-words: Diabetes Mellitus, Level of neuropathy, Sole sensibility.

EVALUATION DES PIEDS D'INDIVIDUES DIABETIQUES E LE DEGRÉE DE NEUROPATIE PERRIFERRIQUE

Resumeé: Le diabetes miellitus (DM) est un important problème de sante publique que peut être liée a complications. Les pieds constituent um grand facteur dans ces complications croniques que les diabetiques sont exposés. Ainsi cela merrite une atention particulièrre, une fois, qu'ils presantant um potentiel elevés que peut produir incapacitées. Le presant etude fut realisé avec set diabetiques du tip II, aparti d'evaluations cliniques des pieds, oú ont etés evalués la sansibilitée dês plante dês pieds,e lê degrée de neuropatie perriferrique. Lês resultas ont demontrés que tout lês patients ont apresantés des regions qui ont pedue la sansibilitée e une oxcilation du degrée de neuropatie de leger a sevère. Ses individues manquant d'informations de base pour prevenir lesions e atentios avec lês pieds e necessitant d'une meilleur orriantation par lês proffessionels de lasanté.

Mots Clefs: Diabetiques miellitus, Degrée de neuropatie, sansibilitée.

EVALUACIÓN DE LOS PIES DE INDIVIDUOS DIABÉTICOS Y EL GRADO DE NEUROPATÍA PERIFÉRICA

Resumen: El *diabetes mellitus* (DM) es un importante problema de salud pública y puede estar asociado a complicaciones. Los pies son un grande factor dentro de las complicaciones crónicas de un diabético, y merecen atención especial, porque representan un elevado potencial para empezar una incapacidad. Este estudio fue realizado con 7 diabéticos tipo 2, por la evaluación clínica de los pies en que se evaluó la sensibilidad plantar y el grado de neuropatía periférica. Los resultados demostraron que todos los individuos tuvieron áreas de sensibilidad reducida y que el grado de neuropatía fue de leve a severo. Estes individuos necesitan de informaciones básicas para la prevención de lesiones y cuidados con los pies y necesitan de mayor orientación por los profesionales de la salud.

Palabras-llave: Diabetes mellitus, Grados de neuropatia, Sensibilidad plantar.

AVALIAÇÃO DOS PÉS DE INDIVÍDUOS DIABÉTICOS E O GRAU DE NEUROPATIA PERIFÉRICA

Resumo: O *diabetes mellitus* (DM) é um importante problema de saúde pública e que pode estar associado a complicações. Os pés constituem um grande fator dentro das complicações crônicas a que o diabético está exposto, e merecem atenção especial, uma vez que apresentam um potencial elevado para produzir incapacitação. O presente estudo foi realizado com 7 diabéticos tipo 2 através de avaliação clinica dos pés em que se avaliou a sensibilidade plantar e o grau de neuropatia periférica. Os resultados demonstraram que todos os participantes tiveram áreas de perda de sensibilidade e que o grau de neuropatia oscilou de leve a severo. Estes indivíduos carecem de informações básicas para prevenção de lesões e cuidados com os pés e necessitam de uma melhor orientação pelos profissionais da saúde.

Palavras-chave: Diabetes mellitus, Graus de neuropatia, Sensibilidade plantar.