130 - MODIFICATIONS IN THE CAPILLARY GLUCOSE AFTER A SESSION OF AEROBICS EXERCISES IN CARRIERS OF DIABETES MELLITUS TYPE 2.

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INTRODUCTION

Melllitus diabetes is classified as a non-infectious chronic disease that presents signs that are common and dependent on others: extreme urine production or even still an increased quantity of urine and the times of having to urine, thirst as a consquence of poliuria. Two other signs that are usually frequent are: the loss of corporal mass, an unlimited necessity in the organism for the use of lipids and proteins to be transformed into energy, the other is extreme fatigue (NORWOOD & INLANDER, 1999)..

There are various types of diabetics, however the two most well- known ones are diabetes type 1 and diabetes type 2. Diabetes type 1 previously known as youth diabetes in virtue of the belief of doctors that it only affected children or young adults (NORWOOD & INLANDER, 1999), is characterized by a self-immune disorder in which the cells that are responsible for the release of insulin are indentified by the immune system as dangerous cells and in this form are destroyed. And as the pancreas are without the Beta cells there is a necessity of insulin injections. As to diabetes 2 it is characterized as being a metabolic disorder with a table of hyperinsulinemic in the majority of patients, however it presents a variation of the levels of insulin from nomal passing to hyperinsulinemia and until to hypoinsulinemic (ALCAZAR et al, 2007). According to Port (2001), mellitus diabetes is understood as to having a genetic origin however by being unlimited it can be aggravated and agonized by diverse factors: emotional or physical stress, viruses during infancy, sedentary life or yet still obesity.

In the United States more than 12 million people are diabetes carriers and many of them are over 65 years that do not know that have developed the disease, for every US$ 7 expense in the assistance of health one US$ 1 goes to the aid in the treatment of diabetes (PROBST & KELLY, 2001.) According to the Brazilian Society of Diabetes (2006), in Brazil there are more than 5 million people with diabetes and due to this an estimate made by the World-wide Organization of health (OMS) foresees that by 2030, there will be 11 million more of diabetes in Brazil.

Even for those who developed the disease it is important that they should keep exercising or initiate physical exercises which helps in the control of glucose in the case of diabetes 2 and mantain the health in diabetes 1.

In a prescribed period of a physical exercise program for diabetics (DMID), the monitoring of the glucose is fundamental to avoid hypoinsulinemia or hyperinsulenemic.The monitoring of the glucose must be carried out before, during and after, the last being done 4 to 5 hours after the exercise session (PROBST & KELLY, 2001).

Considering the information above the objective of the present study was to verify what would be alterations (mg/dl) in the capillary glucose in the diabetic type 2 at the end of an aerobic session of exercises.

METHODOLOGICAL PROCEDURES

Study Type, Population and Samples

It was a field study, being quantitative, descriptive and comparative presenting a transversal drawing. The study was carried out in the city of Palmas, the collection of data was realized at the sports gymnasium at a University Center of the related city.

The population was composed of diabetic individuals of type 2, (5 insulin dependents and 6 not insulin independent individuals) that frequented the Association of Diabetics of the State of Tocantins (ADSTO), all the patients were indicated by a doctor except one which was indicated by a drugstore of the city of Palmas-To.

Being part of the sample, there were 11 diabetic individuals of both sex, being 7 of the masculine sex and 4 of the feminine sex in the age group of ± 51.09 d 8.56 in years, the minimum of 39 and the maximum of 71. The sample was chosen in an intentinal form having the criterion of being diabetic type 2 and the exclusion of having responded YES in the questionaire P.A.R.Q and You.

Materials and Operational Procedures

In the development of the present study the following instruments and materials have been utilized:

For the height measurement a stadiometer of the mark SECCA, design N0 1013522 with dimensions in cm, with a maximum distance of 2 meters. In the measurement of corporal mass a scale of the mark WELMY, model 110 scale of resolution on 100 grams, maximum load of 150kg and the minimum of 2kg. The height and corporal mass were measured accordingly to the standard proposal of Gordon et al.(1988). In the measurement of height and corporal mass the evaluated ones without footwear and wearing gym clothes for the practice of a walking session.

For the calculation of the Body Mass Index (IBM) (kg/m2) an equation was used which was developed be Keys et.al (1972) and in the interpretation of the results the table of the CDC (2007).

To verify the cardiac frequency a cardiac frequency meter was used of the mark Beats Polar Control and for the test of capilliary glycemic it was utilized a glucometer of the mark Advantage and taped of the compatible mark (ACCU-CHEK advantage pro). The diabetic's finger was punctured with a lancet of the mark SOFTCLIX II, followed by taking a drop of blood on a reacting tape which was already already inserted in a turned on device and after 40 seconds the amount of capillary glycemic was obtained.

It is important to point out that the invasive technique was executed by the proper diabetic since this procedure is made routinely in his treatment.

For the analysis of the statistical date the Microsoft Excel 2003 was utilized.

It has been evaluated in the present study the following dependent variables: capillary glycemia and BMI and as a variable independent an aerobic session (walking).

All the expenses relating to the project: transport, fuel, meals , weighing, cardiac frequency meter stadiometer, device to measure the capillary glycemia and tapes were paid by the researcher.

The walking session and the time control for the beginning and finishing of the exercise and the exact measurement of the glucose were accompanied by an academic student of the last semester of the course of Physical Education and supervised and guided by a Professor of Physical Education.

Aerobic exercise session: The chosen aerobic modality was the walking one because of its low impact on the joints of the lower body members and the vertebral column, before the walking exercise was done a sequence of warming up were done in relation to the lower body members and column with the objective of preventing any injuries. The session of exercises followed the procedures below:

· Modality: Walking . According to Araujo apud Oliveira & Milech (2004) walking is an aerobic exercise that does not demand specific abilities in its acomplishment and you can utilized great muscular groups in its practice.

· Frequency: First session.

· Duration: 30 minutes. According to Araujo apud Oliveira & Milech (2004) the recommended time should be minimum time of 30 minutes of aerobic exercises per day.

· Intensity: 50 - 80% of the Maximum Cardiac Frequency (Fcmax) theoretically.

It is recommended that during the walking session to maintain the percentage between 50 to 80% of the cardiac frequency maximum theoretically (ARAUJO apud OLIVEIERA & MILECH, 2004).

In the estimate of the maximum cardiac frequency the equation that was used for men: FC Max = 220 -age and for women FC Max = 226-age. In the estimate for intensity the result of the FG max was multiplied by the value 0.7 (ARAUJO apud OLIVEIRA & MILECH, 2004).

For the diabetics that were going to practice a training session after 30 minutes use of insulin, they have been guided to apply the horomone in the abdomen region and not in the thigh or arm, because if the insulin is applied into the muscle that is going to undergo exercise the hormore will be absorbed more rapidly and runs the risk of having a hypoglycemia (PROBST & KELLY, 2001).

How the exercise session was carried out.

- Local: Sports Gymnasium of a Universtiy Center in the city of Palmas

- Procedure: On arriving at the center the diabetic's height and weight was measured after these procedures the warming up was done giving priority to the lower members of the body and the column soon after the capillary glycemic was measured and then the 30 minutes of walking begins, when the person has acomplished 15 minutes of the walking session another test was done to evalute the capillary glycemia, then when the 30 minutes were acomplished another test was done and soon after another warming up session. Four (4) hours after finishing the walking session the diabetic was requested to do the last evaluation of the glycemic level, the diabetic was then called up by the researcher and is tested and the same will write down the quanity of glycemic obtained.

Statistical Treatment

Descriptive statistics were utilized and the average of a standard devise to measure the central trend and dispersion, to measure the changes in the capillary glucose between the beginning and the ending of an aerobic exercise session the calculation and the substraction of three simple rules.

RESULTS AND DISCUSSIONS

The results and the discussions of the study began with a descriptive presentation of the anthropometric part and an analysis of the BMI (kg/m2), in the sequence will be studied the averages of the acute alterations in the capillary glycemic after an aerobic exercise session, and the last part the alterations of the capillary glycemic of the individuals.

As can be observed from the table 1 the group of diabetics type 2 presented an age group of 51.09 d 08.56, height (cm) 165.36 d 08.04, corporal mass (kg) 76.92 d 10.74 and IMC (kg/m2) of 28, 11 d 03,11.

The value of the BMI of 28.11 (kg/m2) indicates that the group was found overweight (CDC,2007), such a fact justifies itself taking into consideration that 58% of the cases of diabetics type 2 are attributed to weight (WORLD HEALTH ORGANIZATION, apud ROSS & JANSEN, 2007). The concern is that the maintenance of an elevated BMI runs the risk of aggravate the situation of the diabetics.

Table 1 - Anthropometric Characteristics of the Sample. Palmas, 2007 (n = 11).

	Age (years)	Height (cm)	Corporal Weight (CW)	BMI (kg/m²)
$\bar{X}$	51,09	165,36	76,92	28,11
D	08,56	08,04	10,74	03,11

In table 2 it can be verified that the alterations of capillary glycemic after the aerobic exercise session (walking) the results presented point out that the average of capillary glycemic before the exercise is of 183.82 mg/dl d 37.68, and at the end of the exercise 126.55 mg/dl d 37.76. So, having a difference (average) gross of the beginning to the ending an average (mg/dl) of 57.27 d 28.91 or 31.11%.

In the study by Da Silva & Lima (2002) with a sample composed of 33 diabetic persons of type 2 , being 18 men and 15 women in the age group of 45 to 75, there was a reduction of 31.99 mg/dl in the capillary glycemic measured before and after the exercise session, which obeyed the following order: 5 minutes of warming up, 40 minutes aerobic, 10 minutes of RML and 5 minutes of cooling off.

The gross difference in the capillary glycemic between the present study and the research of Da Silva & De Lima (2002) was of 25.28 mg/dl or 44.14%, such a difference could be obtained in virtue to the modality of the exercises being different.

According to the study of Laitano & Meyer (2004) with a sample of 5 diabetic persons of type 1, being 2 women and 3 men with an average age group of 19 d 1.3 years established that after a session of aerobic exercises the capillary gylcemic after the session of aerobic exercises between the present study in relation the study of Laitano & Meyer (2004) verifies a difference of 08.27 mg/dl or 14.44%.

Table 2 - Alterations in the capillary glucose after a session of aerobic exercises with diabetic type 2. Palmas, 2007 (n=11)

	Before of the exercise (mg/dl)	After the exercise (mg/dl)	? (mg/dl)	? (%)
$\bar{X}$	183,82	126,55	57,27	31,11
D	37,68	37,76	28,91	13,09
Mín	134	82		
Máx	328	187		

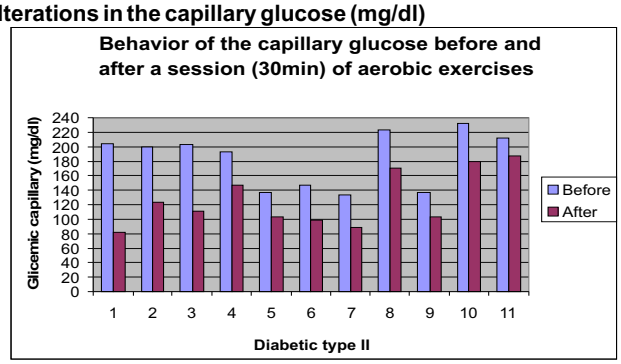
It was verified in the results presented in graph 1 that all the diabetic individuals after a (30min) session of aerobic exercises had a decrease in the rate of glycemic which varied of 25 mg/dl of diabetic 11 to 123mg/dl of diabetic 1, both being sedentary.

This amplitude of 98 mg/dl is understood as normal therefore it depends on the diet of the diabetic followed by the biological individuality or differences between indiviuals of the same species (PROBST & KELLY, 2001).

Diabetic individuals 1, 8, 10 and 11 were the ones who reached the highest levels of glycemic before the aerobic exercise , these four diabetics were the only ones that did not declared the participation in physical exercises during the week. Those that had already practiced regular exercises were those that presented a lesser level of initial glycemic level (5, 6, 7 and 9).

The possible explanation for the lesser initial glycemic level in the diabetics that practice physical exercises are based on the ranks of Probst & Kelly (2001), Carvalho Filho & Neto (2004) which affirm the practice of physical exercises becomes a supporting treatment and not an alternative, because the effect of physical exercise for a diabetic can also elevate glycemic increasing the sensitivity of the fat tissue to insulin, improving the number of affinities to the receivers of the hormone and elevating the caloric loss making the diabetic obeses lose weight.

Graph 1 - Individual alterations in the capillary glucose (mg/dl)



CONCLUSIONS

After the analysis of the data it was concluded that:

·After a session of aerobic exercises the diabetic type 2 had had an average reduction of the capillary glucose of 57.27 mg/dl or 31.11% in relation to the beginning of the exercise sessions.

·The practice of regular physical exercises contributed so that the diabetic type 2 presented an inferior glycemic rate to those who do not practice physical exercises, being so the group that was studied which practiced physical exercises for a period of 30 minutes daily influenced in the maintenance of a lower glycemic rate.

·The diabetics needed a dietary intervention due to the classified BMI of the group as being overweighed almost obese. Obesity for diabetics is considered a powerful risk factor therefore a diabetic who has already had metabolism problems with glucose and with resistance to insulin, obesity will make the problems multiply.

It is suggested that more studies on the effects on acute physical aerobic exercises be carried out with larger sample groups of different ages and varied intensity.

KEY WORDS: Exercises Aerobics, Glucose capillary, Type 2 Diabetics.

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MODIFICATIONS IN CAPILLARY GLUCOSE IN MELLITUS DIABETICS CARRIERS OF TYPE 2 AFTER AN AEROBIC EXERCISE SESSION.

ABSTRACT

Introduction: Currently there has been a growing number of obese people in the world and consequently the diseases associated with obesity has also increased such as High Blood Pressure, Coronary Heart Diseases and Diabetics Type 2 (DT2) which are among the most well-known ones. In the treatment of DT2, utilization of physical exercises were carried-out, besides the controlling of the glicemic and re-education of nutrition. The objective of this study was to verify how (mg/dl) would be the alterations in the capillary glucose after a session of aerobic exercises in of diabetics of Type 2. Methodology: It was a field and quantitative study presented in a transversal drawing. The population study was composed of participants from the Association of Diabetics of the State of Tocantins (ADSTO), patients were indicated by a doctor and also a pharmacist. The sample was intentionally selected, eleven (11) individuals participated in the sample being of both sexes (4 females and 7 males) in the age group of 39 to 71, the height and corporal mass were measured according to Gordon et al (1988), the Body Mass Index was obtained base on the orientations of Keys et al (1972) and in the interpretation of the BMI, the table proposed by the Center Disease Control and Prevention was used (2007). Results: The level of the capillary glucose that diminished was of an average of (mg/dl) 57.27 d 28.91 after an aerobic exercise session. The diabetics who affirmed that they practiced physical exercises regularly presented the glicemic before the exercises to be lower than those who did not practice physical exercises. The BMI (kg/m2) of the diabetics were classified as overweighed, on the threshold of obesity.

KEY WORDS: Aerobic Exercises, Glucose Capillary, Type 2 Diabetics.

DES MODIFICATIONS DANS LA GLUCOSE CAPILAIRE DES PORTEURS DE DIABETES MELLITUS TYPE 2 APRÈS UNE SÉANCE D'EXERCICES AÉROBIQUES.

RESUMÉ

Introduction: Le taux d'obèses dans le monde grandit année après année, ce qui entraîne une égale augmentation des maladies associées à l'obésité. Parmi les maladies les plus connues, nous pourrons citer l'hypertension artériale systémique, les maladies coronairiennes, et lediabètes de type 2 (DT2). Dans le traitement de la DT2, en plus du contrôle de la glycémie et de la rééducation alimentaire, on utilise aussi l'exercice physique. L'objectif de l'étude a été celui de vérifier la variation du taux de glucose (mg/dl) dans un groupe de porteurs de diabètes du type 2 après une séance d'exercices aérobiques. Méthodologie: des études qualitatifs sur le champ tout en présentant un dessin transversal. La population étudiée était composée par des participants de l'Association des Diabétiques de l'Etat du Tocantins (ADETO), par des patients indiquées par une femme médecin et par un pharmacien. L'échantillon, qui a été choisi de façon critérieuse, était composé par quatre femmes et deux hommes ayant entre 39 ans et 71 ans. La taille et la masse corporelle ont été mensurées d'après Gordon et al. (1988), l'indice de masse corporelle a été obtenu à partir des orientations de Keys et al. (1972). Pourcette interprétation, on s'est servi du tableau proposé par le Centre de Contrôle et Prévention de Maladies (2007). Résultats: le niveau du glucose capilaire a diminué, en moyenne (mg/dl) 57,27 d 28,91 après une séance d'exercices aérobiques. Les diabétiques qui ont déclaré avoir l'habitude de pratiquer des exercices physiques régulièrement ont présenté une glycémie avant la séance d'exercices moins importante que celle de ceux qui ne s'exercitaient pas. L'indice de masse corporelle (kg/m²) des diabétiques a été classé comme surpoids, trés près de la limité de l'obésité.

MOTS-CLES: exercices aérobiques, glucose capilaire, diabétiques de type 2.

MODICACIONES EM LA GLICOSIS DESPUÉS DE UMA SESIÓN DE EJERCICIOS AEROBICOS EM PORTADORES DE DIABETES MELLITUS TIPO2.

RESUMEN

Introducción: Anualmente viene creciendo el número de obesos em todo el mundo, por concecuencia lãs enfermedades asociadas com la obesidad también vienen aumentando. Hipertencion Arterial Sistemática, enfermedades cardíacas coronárias e diabetes tipo 2 (DT2) estan entre las más conocidas. Em el tratamento de la DT2, además de la utilización del control de la glicerina y de la reeducación alimentar, se utiliza el ejercicio físico. El objetivo: del estúdio fue confirmar cuantos (mg/dl) serian em las alteraciones de la glicosis capilar, después de uma sesión de ejercicios aeróbicos en um grupo de personas diabéticas tipo 2. Metodologia: el estúdio fue de campo y de cuantidad, apresentando um dibujo em la transversal. La población del estúdio fue compuesto por participantes de la Asiciación de los Diabéticos del estado del Tocantins (ADETO) pacientes indicados conforme y medica y también um farmacêutico. La muestra fue seleccionada de uma forma inencional. Participaron de esta muestra 11 personas de ambos sexos (4 del sexo femenino y 7 del sexo maculino). En la edad média de 39 - 71 años. La estatura y la masa corporal fueron mensuradas conforme Gordon et. Al (1998), el inicie de massa corporal (IMC), se utilizó la tabla propuestra por el Centro de Prevención de enfermedades (2007). Resultados; El nível de glicosis capilar disminuen média (mg/dl) 57,27 d 28,91despues de uma sesión de ejercicios earobicos. Los diabeticos que declaran que hacian algún ejercicio físico com regularidade presentaban uma glicemia, antes del ejercicio, menor que las de aquellos que no praticaban uma glicemia ejercicios físicos. O IMC (kg/m²) de los diabeticos fue clasifidado como em sobrepeso, limiar para la obesidade.

PALAVRAS LLAVES: Ejercicios Aeróbicos, Glicosis capilar, Diabeticos Tipo 2.

MODIFICAÇÕES NA GLICOSE CAPILAR APÓS UMA SESSÃO DE EXERCÍCIOS AERÓBICOS EM PORTADORES DE DIABETES MELLITUS TIPO 2

RESUMO

Introdução: Anualmente vem crescendo o número de obesos em todo o Mundo, conseqüentemente as doenças associadas com a obesidade também vem aumentando. Hipertensão Arterial Sistêmica, Doenças Cardíacas Coronarianas e Diabetes Tipo 2 (DT2) estão entre as mais conhecidas. No tratamento da DT2, além da utilização do controle da glicemia e da reeducação alimentar, utiliza-se o exercício físico. O objetivo do estudo foi verificar quanto (mg/dl) seriam as alterações na glicose capilar, após uma sessão de exercícios aeróbicos em um grupo de pessoas diabéticas tipo 2. Metodologia: O estudo foi de campo e quantitativo, apresentando um desenho transversal. A população do estudo foi composta por participantes da Associação dos Diabéticos do Estado do Tocantins (ADETO), pacientes indicados por uma médica e também por um farmacêutico. A amostra foi selecionada de forma intencional. Participaram da amostra 11 indivíduos de ambos os sexos (4 do sexo feminino e 7 do sexo masculino), na faixa etária de 39 - 71 anos. A estatura e a massa corporal foram mensuradas conforme Gordon et. al (1988), o Índice de Massa corporal (IMC) foi obtido baseado nas orientações de Keys et al. (1972) e na interpretação do IMC utilizou-se a tabela proposta pelo Centro de Controle e Prevenção de Doenças (2007). Resultados: O nível de glicose capilar diminuiu em média (mg/dl) 57,27 d 28,91 após uma sessão de exercícios aeróbicos. Os diabéticos que declararam que praticavam exercícios físicos com regularidade, apresentaram uma glicemia antes do exercício menor do que aqueles que não praticavam exercícios físicos. O IMC (kg/m^2) dos diabéticos foi classificado como em sobrepeso, limiar para a obesidade.

PALAVRAS CHAVE: Exercícios Aeróbicos, Glicose Capilar, Diabéticos Tipo 2.