SUBACUTE BEHAVIOR OF BLOOD GLUCOSE AND BLOOD PRESSURE IN TYPE 1 DIABETICS AFTER A STRENGTH EXERCISE SESSION: CROSSOVER RANDOMIZED CLINICAL TRIAL

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ABSTRACT

INTRODUCTION: Type 1 Diabetes Mellitus (T1DM) is characterized by a severe deficiency of insulin due to the destruction of pancreatic beta cells, associated with autoimmunity. It is more common in children and adolescents, but it can appear at any age. It presents clinically in a sudden manner, often with a propensity for ketosis and ketoacidosis, requiring full insulin therapy from the diagnosis. OBJECTIVE: The objective of this study is to evaluate the subacute responses of blood glucose and blood pressure in adults with type 1 diabetes after a session of strength exercises. METHODS: The sample will consist of 30 participants with Type 1 Diabetes Mellitus. Capillary blood glucose will be measured using a glucometer, and blood pressure will initially be measured during the pre-study evaluations on both arms, adopting the side with the higher value for the purposes of the research. RESULTS: The present project presented some limitations due to the execution process of the data collection stage, and it is estimated that its completion will occur by the end of 2023.

Keywords: diabetes; blood pressure; strength exercise.

INTRODUCTION

Type 1 Diabetes Mellitus (T1DM) is characterized by a severe deficiency of insulin resulting from the destruction of pancreatic beta cells, associated with autoimmunity. It is more common in children and adolescents, but it can appear at any age. It presents clinically in a sudden manner, often with a propensity for ketosis and ketoacidosis, requiring full insulin therapy from the diagnosis (LU X., 2020).

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The clinical picture of a patient with type 1 diabetes (T1D) includes symptoms such as abnormal thirst, dry mouth, sudden weight loss, frequent urination, lack of energy, fatigue, constant hunger, and blurred vision. The lack of treatment for this comorbidity can lead to numerous complications, including diabetic peripheral neuropathy, heart failure, diabetic retinopathy, kidney disease, dyslipidemia, infections, liver diseases, among others (COCKCROFT, 2019).

The pharmacological treatment of T1D includes insulin to control blood glucose levels in all patients. There are different types of insulin, depending on how quickly they work, when they peak, and how long they last. Insulin is commonly delivered with a syringe, insulin pen, or insulin pump (INTERNATIONAL DIABETES FEDERATION, 2020).

Worldwide, diabetes has become a serious public health problem, with predictions being surpassed with each new screening. For example, in 2000, the global estimate of adults living with diabetes was 151 million. In 2009, it had grown by 88%, to 285 million. In 2020, it is estimated that 9.3% of adults, between 20 and 79 years old (a staggering 463 million people), live with diabetes. Moreover, 1.1 million children and adolescents under 20 years old have type 1 diabetes. A decade ago, in 2010, the global projection by the IDF for diabetes in 2025 was 438 million. With five more years ahead, this projection has already been adjusted to 463 million (MINISTRY OF HEALTH, 2009).

Exercise works by increasing the entry of glucose into cells, using the mechanism of GLUT4 receptor translocation, which is primarily responsible for glucose entry into muscle cells. This mechanism assists insulin in reducing glucose levels in circulation (DEBAT et al., 2018).

Some variables must be analyzed before starting a training program, such as: the intensity, duration of the exercise, the individual's level of activity, the presence of disease complications, and the clinical condition. Insulin dosages and/or carbohydrate replenishment are some of the strategies that can be used to prevent exercise-related hypoglycemia. Another important factor is hydration during these activities and the monitoring of blood glucose levels performed before, during, and after exercise (RAMALHO; SOARES 2008).

METHODOLOGY

The objective of this study is to evaluate the subacute responses of blood glucose and blood pressure in adults with type 1 diabetes after a session of strength exercises.

Based on a controlled, randomized, and crossover clinical trial, the sample will consist of 30 participants with Type 1 Diabetes Mellitus (T1DM), selected from a Diabetic Association in the city of Anápolis, Goiás, through direct contact with the association, comprising men and women according to the order of recruitment and based on the inclusion/exclusion criteria mentioned below.

The inclusion criteria for the research are: diagnosis of T1D, according to the guidelines of the American Diabetes Association; age between 25 and 55 years; regular treatment and a minimum quarterly frequency; use of insulin; signing of the Free and Informed Consent Form (FICF).

And the exclusion criteria are: febrile state and/or infectious disease; class II obesity or higher – BMI (body mass index) ≥ 35 Kg/m2; class III or IV heart failure; recent cardiovascular event (last 3 months); chronic renal failure; severe liver disease; active smoking; orthopedic limitations or any physical or mental limitation that prevents the performance of exercises.

Capillary blood glucose will be measured using the Accu-Checkgo brand and model glucometer, Roche Group, Germany, which allows for direct verification of glucose levels through the aspiration of capillary blood by the reagent strip. For this purpose, the blood glucose will be measured on the index fingers by the researcher, who will be properly equipped with the necessary personal protective equipment: lab coat, gloves, glasses. The finger to be collected will be aseptically cleaned using cotton with 70% alcohol. Afterwards, there will be lancing with a disposable single-use lancet of the same brand, which will be immediately discarded in a sharps disposal bin (sharps container). Next, the researcher will apply light pressure to the pricked finger until a drop of blood is produced, and will then bring the reagent strip into contact to absorb the blood, where a chemical reaction and analysis by the glucometer will occur, generating the blood glucose value in mg-dL. Next, the disposal of the strip and cotton will be carried out in specific bins for that purpose.

The clinical assessment of Blood Pressure (BP) will be conducted following the guidelines of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure with the individual seated, using a semi-automatic device of the brand and model Omron HEM 742. Blood pressure will initially be measured during the pre-study evaluations on both arms, adopting the side with the higher value for the purpose of the research. Two measurements will be taken at each moment of the study, with a 2-minute interval, and the average of these will be adopted.

The PE will be held at the Bluefit Gym, which has all the equipment for the strength exercise session. After the patients arrive, they will remain at rest in a calm and comfortable location, seated for 10 minutes for the measurement of blood glucose and blood pressure. Next, they will perform the PE, which will consist of 5 minutes of joint warm-up on 3 machines, with 15 repetitions at 50%1RM. Next, they will perform the main part, which will consist of 6 different exercises: front pull; bench press on the machine; bicep curl; leg press on the machine; seated knee extension on the machine (leg extension chair); calf raise on the leg press, divided into 3 sets of 8-10 repetitions with 2-minute intervals between sets and exercises. The Valsalva maneuver will be discouraged for all participants.

After the protocol is completed, the patients will be transferred to a calm location, where their blood glucose and blood pressure will also be measured immediately while seated. They will remain in the same location seated for 60 minutes for the successive recording of blood glucose and blood pressure, with intervals of 15 minutes.

RESULTS

The present project presented some limitations due to the execution process of the data collection stage, and it is estimated that its completion will occur by the end of 2023.

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