

GLYCEMIC BEHAVIOR ACUTE IN HEALTHY YOUNG PEOPLE AFTER CIRCUIT TRAINING SESSION: PROTOCOL STUDY

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ABSTRACT

Introduction: The practice of strength training (ST) with physical exercises improves glycemic stability during exercise and reduces the duration and severity of post-exercise hypoglycemia in individuals with type 2 diabetes. Although the effects of strength training (ST) on health are vast in the literature, the acute and subacute response of plasma glucose with circuit strength training (CST) in young individuals is very scarce. **Objective:** Develop a study protocol on the evaluation of plasma glycemic behavior in healthy young adults before, during, and after circuit strength training with active rest. **Methods:** This is a cross-sectional study. The participants in this type of study will be selected based on certain variables of interest, informed about the study, and sign the ICF. The participants will be subjected to anamnesis, collection of anthropometric evaluation, in order to outline the physical-functional profile, will be taken to the weight room, where they will remain seated for 10 minutes for pre-protocol capillary blood collection, these will be randomized into 2 groups: one group will undergo a session with a control protocol without exercise and the other, a session with an experimental protocol with circuit strength training. Capillary blood glucose will be collected before, during, and after the protocols. **Discussion:** From this cross-sectional study protocol, it is expected to contribute additional information on the understanding of the acute and subacute effects of plasma glycemia with circuit strength training, with active rest, in young individuals, thus providing a safer TFC prescription.

Keywords: Circuit training; Acute effect; Subacute effect; Plasma glucose.

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INTRODUCTION

An unhealthy diet and lack of physical activity have increased the prevalence of obesity, type 2 diabetes, and metabolic syndrome worldwide (4). We know that lifestyle interventions can significantly reduce the incidence of diabetes and slow the rise in blood sugar in non-diabetics and diabetics (3).

Circuit strength training (CST) is a strategy aimed at altering parameters to improve plasma glucose levels, increasing energy expenditure, and enhancing exercise responses at any point during the exercise, in addition to being well-tolerated by individuals with excess weight (7,5-6).

Traditionally, the treatment and control of plasma glucose levels involve lifestyle changes, such as increasing daily exercise, but despite various strategies, behavioral reeducation programs continue to face the challenge of maintaining participants' commitment to a circuit training program (2,6).

Our hypothesis is that the circuit strength training method promotes positive reactions in people. Moreover, participants with higher TRC rates may experience a beneficial effect. The objective of this study is, therefore, to develop a cross-sectional research protocol to assess the plasma glycemic behavior in healthy young adults before, during, and after training.

METHODOLOGY

Cross-sectional study, in which participants will be selected based on inclusion and exclusion criteria. The sample will consist of 30 individuals, higher education students, who were divided by lottery into 2 equally sized groups: Control Protocol (n=15) and Experimental Protocol (n=15).

They will be included in the study, male volunteers with at least 6 months of experience in strength training; aged 20 to 30 years; no chronic disease; non-smokers. And excluded are those who have had a recent cardiovascular event (last 3 months); and present any physical or mental limitation that prevents the performance of the study procedures.

Procedures

After signing the ICF in accordance with Resolution 510/2016 of the National Health Council (CNS), and inclusion in the research. The anamnesis will be conducted in the format of a semi-structured interview.

The physical assessment will consist of anthropometric measurements (height and weight) for the calculation of Body Mass Index (BMI) [WHO] - electronic scale of the Welmy brand, with a precision of 0.1kg (Filizola). Height will be measured using a stadiometer graduated in centimeters with a precision of 1mm for body mass (Sanny). For the calculation of %BF, the bioimpedance test using electrodes, with a Maltron 906BF device. After these procedures, the individuals will perform one-repetition maximum tests (One Repetition Maximum - 1 RM)(8).

To those who exceed 1 repetition, a time of 3 to 5 minutes will be adopted for the next test, with a maximum of 4 tests. Alternating between the upper and lower limbs on the weight machines: bench press, front pull, leg curl, and leg extension.

The evaluated person will be instructed on the technique for performing the exercise; the evaluator will pay attention to the position adopted by the practitioner at the time of measurement; the positions will be stipulated.

Plasma glucose will be measured using the glucose monitor, automatic and disposable lancing device, and test strips (Accu-chekGo, Roche Group, Germany 2010).

Intervention protocols

The participants will be taken to a weightlifting room, where they will remain seated for 10 minutes for the first capillary blood collection.

In the strength training protocol using the circuit methodology, exercises will be performed in sequence and without rest. The individuals will do a 5-minute warm-up with stretches for the areas that will be trained. The circuit will consist of 7 exercises: front pull-down with supinated grip, flat bench press on the machine, bicep curl, triceps on the pulley, LegPress, leg extension machine, and leg curl machine. Three circuits will be performed in the sequence of the aforementioned exercises. Each circuit will consist of 12 to 15 repetitions at 70% of the One Repetition Maximum (1RM). After the execution of each circuit, there will be a blood collection,

with samples taken at the end, at minutes 0, 15, and 30 after the completion of the last exercise circuit.

In the no-training protocol, the participants will also be taken to a weightlifting room, where they will sit for 10 minutes for capillary blood collection and will not perform any training. Again, their blood glucose will be measured after 10 minutes and after 20 minutes (2 measurements corresponding to the period during the protocol with circuit strength training). After the end of this period, the participants will remain seated for post-protocol measurements at 0 minutes, 15 minutes, and 30 minutes after.

Statistical analysis

The data will be presented through mean and standard deviation. The statistical treatment will be carried out using the SPSS 18 program. The Kolmogorov-Smirnov test will be applied to evaluate the distribution of the data. For the analysis of means, intra and intergroup, the paired t-test will be used. For this purpose, a significance level of $p < 0.05$ will be adopted.

Place of research and data collection

Weightlifting room of the multi-sport center and in the Exercise Physiology Laboratory/LAFEX of the Higher School of Physical Education and Physiotherapy of Goiás (ESEFFEGO) at the State University of Goiás (UEG).

DISCUSSION

In accordance with the literature(1,2), we observe that circuit strength training produces a significant reduction in blood glucose levels immediately after exercise. This decrease may be due to the uptake of glucose by the muscles in response to physical exertion, as well as the increase in insulin sensitivity(4). Moreover, the rapid normalization of post-exercise glucose levels was consistent with previous studies that highlighted the acute benefits of exercise on glycemic control(5).

However, with some people, there is a more pronounced reduction in glucose levels than with others. These variations are related to individual factors, such as

body composition, aerobic capacity, and genetics(6). Therefore, the results suggest that the individualization of exercise strategies may be fundamental to improving glycemic benefits in healthy young people.

Furthermore, it is important to emphasize that this protocol study does not address the long-term impact of circuit strength training on glycemic control or chronic diabetes complications. Thus, future investigations can focus on evaluating the cumulative effects of circuit strength training and its role in the prevention of metabolic diseases in healthy young individuals(8).

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