TRAINING PROTOCOL ON CHANGES IN BLOOD GLUCOSE LEVELS AND BLOOD PRESSURE IN TYPE 1 DIABETES PATIENTS

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SUMMARY

Type 1 Diabetes Mellitus (T1DM) is an endocrine condition resulting from the autoimmune destruction of pancreatic beta cells, leading to severe insulin deficiency. Clinically, T1DM manifests with symptoms such as polyuria, polydipsia, xerostomia, unexplained weight loss, fatigue, polyphagia, and blurred vision. Glycemic self-monitoring is a critical process for these patients, allowing the measurement of glucose in different contexts such as home, school, and work environments, and adjusting the insulin dose as needed. According to data from the International Diabetes Federation, in 2019, Brazil ranked fifth globally in terms of diabetes prevalence, with 16.8 million adults affected in the age group of 20 to 79 years. The American Diabetes Association recommends that adults with T1D engage in at least 150 minutes per week of moderate to vigorous physical activities. For children and adolescents with T1D, it is recommended to engage in at least 60 minutes of daily physical activity, including muscle and bone strengthening exercises three times a week. Regular physical activity is associated with a reduced risk of future cardiovascular diseases, improved long-term glycemic control, better cardiovascular conditioning, quality of life, reduced daily insulin needs, and better weight control. Moreover, it plays a crucial role in the primary and secondary prevention of diabetes-related cardiovascular diseases. This study aims to evaluate the effects of strength training on glycemic parameters after a single exercise session in adults with T1DM.

Keywords: Diabetes mellitus; training; blood pressure.

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Introduction

Type 1 Diabetes Mellitus (T1DM) is a serious endocrinological condition characterized by severe insulin deficiency, resulting from the autoimmune destruction of pancreatic beta cells. Although often diagnosed in childhood and adolescence, T1DM can manifest at any age. The onset of the disease is generally abrupt and can lead to complications such as ketosis and ketoacidosis, requiring continuous insulin treatment from diagnosis (LU X., 2020).

It is important to distinguish DM1 from Type 2 Diabetes Mellitus (DM2), which is characterized by insulin resistance and a partial deficiency in insulin secretion by beta cells. DM2 is often associated with obesity and aging, causing significant metabolic disturbances. The differentiation between DM1 and DM2, although challenging, is crucial and requires a detailed assessment of the medical history, physical examination, and laboratory tests (RODACKI, 2022).

Systemic arterial hypertension (SAH), a condition defined by elevated blood pressure levels, is linked to a series of serious complications, including stroke, myocardial infarction, coronary artery disease, heart failure, and renal failure, significantly contributing to cardiovascular mortality. Data from DATASUS indicate that, in 2017, approximately 1,312,663 deaths from cardiovascular diseases were recorded, with 45% of these cases associated with hypertension (MENDES et al., 2017).

In 2019, Brazil was the fifth country with the highest incidence of diabetes globally, with 16.8 million adults affected, and it is projected that this number will reach 21.5 million by 2030 (SANTOS; RODRIGUES 2023). The secretory function of pancreatic beta cells, assessed through C-peptide measurement, is an important marker for the classification of diabetes, as patients with T1D often exhibit a significant loss in insulin secretion. Furthermore, genetic and environmental factors, such as family history and viral exposures, can influence the risk of developing the disease (BRAZILIAN DIABETES SOCIETY, 2022).

DM1 presents with symptoms such as polyuria, polydipsia, xerostomia, abrupt weight loss, fatigue, polyphagia, and blurred vision. The lack of adequate treatment can lead to serious complications such as peripheral neuropathy, heart failure, diabetic retinopathy, kidney disease, and dyslipidemia (COCKCROFT, 2019). Hypoglycemia,

often resulting from poor adherence to treatment or intense physical exercise, is an additional complication to be monitored (ARAÚJO et al., 2019).

The treatment of T1DM involves the administration of insulin to regulate blood glucose levels, using different forms of insulin based on their onset of action, peak, and duration. Insulin is generally administered through syringes, pens, or insulin pumps (INTERNATIONAL DIABETES FEDERATION, 2020). Self-monitoring of blood glucose is essential for the proper dosing of insulin and should be performed at least four times a day (INTERNATIONAL DIABETES FEDERATION, 2020).

Globally, the prevalence of diabetes has increased substantially, with an estimated 463 million adults affected in 2020 and 1.1 million children and adolescents under 20 years old with type 1 diabetes. Global projections for 2025 were revised to 463 million, highlighting the continuous growth of the disease (MINISTRY OF HEALTH, 2009).

In Brazil, diabetes ranked third among diseases with the highest morbidity and mortality rates in 2017, with a notable increase in cases among men (BRAZILIAN DIABETES SOCIETY, 2022). Physical exercise, through the translocation of the GLUT4 receptor, facilitates the entry of glucose into muscle cells, helping to reduce circulating glycemic levels (DEBAT et al., 2018). Moreover, regular physical activity can reduce the risk of cardiovascular diseases, improve glycemic control, cardiovascular conditioning, and quality of life, as well as reduce the daily need for insulin and help with weight management (COCKCROFT, 2019; PEREIRA, 2022).

The present study aims to evaluate the acute effects of strength exercise on blood pressure and glycemic levels in adult individuals with type 1 diabetes (T1D), using a training protocol approach.

Methodology

This is a literature review in which the following databases were used: PUBMED, SCIELO, and BVS, with the inclusion criteria being: patients with type 1 diabetes (T1D) associated with resistance training (physical exercises), clinical trials from the last 10 years, patients of both sexes, aged between 25 and 55 years. The exclusion criteria determined by articles that do not meet the required criteria such as:

reviews, year of publication, dissertations that do not address the topic, that do not use patients with DM1, and having other associated pathologies.

Conclusion

It is widely recognized that strength training induces significant organic adaptations in its practitioners, especially in individuals with DM1. There are still gaps in knowledge, and more studies are needed, both with trained and untrained individuals, to investigate the hypotensive effects. Moreover, it is important to conduct pharmacological and nutritional monitoring of the participants. The study envisions that the practice of physical activity aims to result in the reduction of diseases and help with glycemic control, improving the quality of life for these patients.

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