



Review article

Chronic effect of aerobic exercise on anthropometric, biochemical and hemodynamic variables in individuals with type 2 diabetes mellitus: A systematic review

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ABSTRACT

Objective: The aim of this study was to analyze the effects of aerobic exercise on biochemical, anthropometric and hemodynamic profiles of patients with type 2 diabetes mellitus, in randomized clinical trials and case-control studies.

Method: The databases used in the study were: MEDLINE, BVS (LiLacs), IBECs (Spain), MED Caribbean and Central Controlled Clinical Trial Registry. We included studies published from 2004 to 2014. Were analyzed anthropometric (body mass index, waist circumference and percentage of body fat), hemodynamic (blood pressure and heart rate) and biochemical parameters (glycemia, glycated hemoglobin, insulin, cholesterol-HDL, cholesterol-LDL and triglycerides).

Results: The results showed that, aerobic exercise of moderate intensity and often three or more times a week, promoted a significant reduction in waist circumference, blood glucose and diastolic blood pressure.

Conclusion: It is concluded that there are benefits of aerobic exercise of moderate intensity practiced regularly often more than three times a week on waist circumference, glycemia and diastolic blood pressure in diabetes mellitus type 2.

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Efecto crónico de ejercicio aeróbico en variables antropométricas, bioquímicas y hemodinámicas en individuos con diabetes mellitus tipo 2: una revisión sistemática

RESUMEN

Objetivo: El propósito de este estudio fue analizar los efectos del ejercicio aeróbico sobre los perfiles bioquímicos, antropométricos y hemodinámicos de pacientes con diabetes mellitus tipo 2, en ensayos clínicos aleatorizados y estudios de casos y controles.

Método: Las bases de datos utilizadas en el estudio fueron: MEDLINE, BVS (LiLacs), IBECs (España), MED Caribe y el Registro Central de Ensayos Clínicos Controlados. Se incluyeron estudios publicados desde 2004 hasta 2014. Se analizaron medidas antropométricas (índice de masa corporal, circunferencia de la cintura y porcentaje de grasa), hemodinámicas (presión arterial y frecuencia cardíaca) y bioquímicas (glucemia, hemoglobina glicosilada, insulina, Colesterol-HDL, Colesterol-LDL y triglicéridos).

Palabras clave:

Terapia por ejercicio

Glucemia

Perfil antropométrico

Perfil lipídico

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Resultados: Los resultados mostraron que el ejercicio aeróbico, de intensidad moderada, realizado de 3 veces o más por semana causó una reducción significativa en la circunferencia de la cintura, la glucemia y la presión arterial diastólica.

Conclusión: Se concluye que hay beneficios del ejercicio aeróbico de intensidad moderada, practicado regularmente más de 3 veces a la semana, en el perímetro de la cintura, glucemia y presión arterial diastólica en pacientes con diabetes tipo 2.

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Efeito crónico do exercício aeróbico sobre variáveis antropométricas, bioquímicas e hemodinâmicas em indivíduos com diabetes mellitus tipo 2: uma revisão sistemática

R E S U M O

Objetivo: O objetivo do presente estudo foi analisar os efeitos do exercício aeróbico sobre os perfis bioquímico, antropométrico e hemodinâmico de pacientes com diabetes mellitus tipo 2, em ensaios clínicos randomizados e estudos de caso-controle.

Método: As bases de dados utilizadas no estudo foram: MEDLINE, BVS (LiLacs), IBECs (Espanha), MED Caribe e Central de Registros de Ensaios Clínicos Controlados. Foram incluídos estudos publicados nos anos de 2004-2014. Foram analisadas as medidas antropométricas (IMC, circunferência de cintura e percentual de gordura), hemodinâmicas (pressão arterial e frequência cardíaca) e bioquímicas (glicemia, hemoglobina glicada, insulina, colesterol-HDL, colesterol-LDL, triglicérides).

Resultados: Os resultados evidenciaram que o exercício aeróbico, de intensidade moderada e com frequência igual ou superior a três vezes por semana promoveu redução significativa no perímetro da cintura, na glicemia e na pressão arterial diastólica.

Conclusão: Conclui-se que há efeitos benéficos do exercício físico aeróbico de moderada intensidade, praticado de forma regular com frequência de 3 ou mais vezes por semana, sobre o perímetro da cintura, glicemia e pressão arterial diastólica em indivíduos com diabetes mellitus tipo 2.

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Palavras-chave:

Terapia por exercício
Glicemia
Perfil antropométrico
Perfil lipídico

Introduction

Diabetes mellitus type 2 (DM2) is a metabolic disease characterized by insulin resistance and dysfunctional pancreatic beta cells. Patients are often concomitantly overweight or obese.¹ DM2 is one of the leading causes of death worldwide, and is primarily associated with an aging population, urbanization, and high prevalence of physical inactivity. Diabetes affects 382 million people worldwide, of which 61 million are located in the Americas, with 24 million in Central and South America.² In developed countries, DM2 is ranked between the fourth and eighth position among the major diseases in terms of prevalence, and the direct costs of treatment vary between 2.5 and 15% of annual health budgets.³ In Brazil, between 1991 and 2000 there was a 19% increase in the number of cases, followed by a decline of 8% between 2000 and 2009; however, in 2009 alone, incidence increased by 24%.⁴ The Brazilian capitals with the highest prevalence of DM2 in 2012 were São Paulo (9.3%) and Florianópolis (7.3%).⁴

Given this epidemiological situation, it is critical to invest in studies that provide scientific evidence on the efficiency and effectiveness of targeted protocols and intervention processes that improve the quality of life for DM2 patients. In this context, active participation in exercise programs is the unanimous recommendation of health professionals for both prevention and treatment of DM2.

Physical exercise programs may aid long-term control of blood glucose levels, and can acutely stimulate glucose uptake, which helps to increase the sensitivity of insulin to receptors.⁵ An understanding of the underlying physiological responses to physical exercise is crucial for adequate medical management and proper counseling with respect to suggested activity and/or physical

exercise load. This goal will improve the efficiency of diabetes interventions, increasing exercise and activity levels in DM2 patients.⁶

Current recommendations for DM2 patients include at least 150 min of moderate intensity exercise per week (over 3–7 days), or 75 min of high intensity exercise per week (over 3 days).¹ This review article evaluated the effects of aerobic exercise on biochemical, anthropometric, and hemodynamic profiles of patients with DM2 in randomized clinical trials, case studies, and controls.

Method

Literature search strategy

Systematic survey of the primary studies was conducted using the following databases: MEDLINE (PubMed), BVS (LiLacs), IBECs (Spain), Med Caribe, and the Central Registry of Controlled Clinical Trials (Cochrane), published between 2004 and December 2014. A search strategy was developed for MEDLINE, accessed via PubMed, based on titles of Medical Subject Headings (MeSH) identified through article terms and key words. We searched for articles in LiLacs using Health Sciences Descriptors (DeCS). We reviewed reference lists of all articles included in the study.

The search strategy for Med Caribbean used MeSH terms and their synonyms as a starting point. However, the search strategy for articles in the Central Registry of Controlled Clinical Trials was based on the keywords to yield a greater number of articles.

Various combinations of the keywords “physical exercise”, “physical activity” and “diabetes mellitus type 2” were used in English, Portuguese, and Spanish as appropriate, using the MeSH terms “exercise”, “motor activity”, and “diabetes mellitus type 2” crossed with Boolean connectors AND, OR, or AND OR.

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