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REVIEW ARTICLE

Metabolic effects of exercise on childhood obesity: a current view

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KEYWORDS

Exercise;
Pediatric obesity;
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Abstract

Objective: To review the current literature concerning the effects of physical exercise on several metabolic variables related to childhood obesity.

Data source: A search was performed in Pubmed/MEDLINE and Web of Science databases. The keywords used were as follows: Obesity, Children Obesity, Childhood Obesity, Exercise and Physical Activity. The online search was based on studies published in English, from April 2010 to December 2013.

Data synthesis: Search queries returned 88,393 studies based on the aforementioned keywords; 4,561 studies were selected by crossing chosen keywords. After applying inclusion criteria, four studies were selected from 182 eligible titles. Most studies found that aerobic and resistance training improves body composition, lipid profile and metabolic and inflammatory status of obese children and adolescents; however, the magnitude of these effects is associated with the type, intensity and duration of practice.

Conclusions: Regardless of the type, physical exercise promotes positive adaptations to childhood obesity, mainly acting to restore cellular and cardiovascular homeostasis, to improve body composition, and to activate metabolism; therefore, physical exercise acts as a co-factor in fighting obesity.

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PALAVRAS-CHAVE

Exercício físico;
Obesidade pediátrica;
Nutrição da criança;
Metabolismo

Efeitos metabólicos do exercício físico na obesidade infantil: uma visão atual**Resumo**

Objetivo: Revisar a literatura atual a respeito dos efeitos do exercício físico sobre diferentes variáveis metabólicas da obesidade infantil.

Fontes de dados: A pesquisa foi realizada nas bases de dados *Pubmed* e *Web of Science*. Os descritores utilizados foram: *Obesity*, *Children obesity*, *Childhood obesity*, *Exercise e Physical Activity*. A pesquisa eletrônica foi realizada baseada nos estudos publicados a partir de abril de 2010 a dezembro de 2013, em idioma inglês.

Síntese dos dados: O rastreamento dos estudos com os descritores encontrou 88.393 estudos. Após cruzamento entre os descritores, obteve-se 4.561 estudos. Desses, depois da análise dos títulos, foram cogitados 182 relevantes referências, sendo então submetidos aos critérios de inclusão/exclusão, totalizando, ao final, 39 estudos. A maioria dos estudos relacionou a prática de exercícios físicos aeróbicos e resistidos à melhora da composição corporal, regulação do perfil lipídico, metabólico e estado inflamatório de crianças e adolescentes obesos, entretanto a magnitude dos efeitos está associada ao tipo, à intensidade e à duração da prática.

Conclusões: O exercício físico, independentemente do tipo, mostra-se capaz de promover adaptações positivas sobre a obesidade infantil, atuando principalmente na restauração da homeostase celular e cardiovascular, melhora da composição corporal e ativação metabólica, o que o torna indicado como coadjuvante no combate a obesidade.

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Introduction

Obesity is a metabolic disorder characterized by a chronic inflammatory condition and excessive accumulation of body fat, which represents a health risk and contributes to the development of other diseases, such as type 2 diabetes, hypercholesterolemia, arterial hypertension, cardiovascular disease, obstructive sleep apnea syndrome, musculoskeletal impairments and several types of cancers.^{1,2}

The etiology of obesity seems to be associated with several factors, such as genetic polymorphisms,^{3,4} dysfunction of the hypothalamic hormone signaling related to satiety, appetite and hunger,^{5,6} increased release of proinflammatory adipokines by white adipose tissue, and positive energy balance, in which the high total calorie intake, mainly high intake of energy-dense foods rich in saturated fats,⁷ sugar and salt exceeds daily calorie requirement.⁸

The development of obesity in the early stages of life is associated with the maintenance of the physiopathological state during adulthood. Childhood obesity can be defined as a condition of excessive accumulation of body fat in adipose tissue during childhood, with negative implications for health.⁹ The worldwide prevalence of childhood obesity is rapidly increasing in recent decades, being characterized as a global epidemic.⁹ In recent decades, children have become less active, probably encouraged by technological advances and socioeconomic factors.¹⁰ Obesity in childhood is the most important known risk factor for cardiovascular disease in adulthood, and these factors, when present in childhood, increase later in life, so it is necessary to fight them since the early stages of life, especially in relation to the life habits observed during this period.¹¹

The benefits that physical exercises have on individuals' health have been well established, by improving cardiorespiratory fitness, body composition, and psychosocial well-being, among others. Physical exercise has been used as an important tool in the prevention and treatment of obesity¹² by developing physical qualities that positively alter body composition, metabolic activity and by attenuating the comorbidities associated with excess weight.^{4,13-15}

An inverse association has been demonstrated between physical activity level and development of obesity, mainly in the early stages of life,^{9,11,16,17} which justifies adherence to these practices, especially by children. While physical activity recommendations are well established for the adult population to fight obesity and its effects, the magnitude of the volume, intensity and frequency of physical activity is still controversial in the pediatric population.¹²

Considering that most clinical recommendations for treatment of obesity are based on the combination of several interventions, such as changing eating habits, medication use, regular physical activity and others, it is necessary to identify, assess or quantify the magnitude of the contribution of the possible types of treatment. Therefore, given the multifactorial nature of obesity, it is necessary to explain, in fact, the degree of contribution of physical exercise in the reduction and treatment of childhood obesity and its associated comorbidities.

Thus, the aim of this study was to review the current literature regarding the effects of exercise on several metabolic variables of childhood obesity.

Method

Method

A literature review was performed, focusing on studies that reported the effects of exercise on several metabolic variables involved in childhood obesity. The databases used for

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