Obesity Research & Clinical Practice (2015) xxx, xxx–xxx

ORIGINAL ARTICLE

Effect of aerobic exercise on blood lipid and glucose in obese or overweight adults: A meta-analysis of randomised controlled trials

Min Cai[a], **Zhichun Zou**[b,*]

[a] *Department of Physical Education, ShangHai JiaoTong University, Shanghai 200240, PR China*
[b] *Department of Physical Education, Southwest University for Nationalities, Chengdu 610041, PR China*

Received 4 August 2015; received in revised form 20 October 2015; accepted 28 October 2015

KEYWORDS
Aerobic exercise;
Blood lipid and glucose;
Obese or overweight

Summary
Objective: Aim was to assess the effect of aerobic exercise (AE) on blood lipid and glucose in obese or overweight adults.
Methods: Literature search was performed on PubMed, EMBASE and Cochrane library, up to June 2015. The pooled weighted mean difference (WMD) and its 95% confidence interval (CI) were calculated to assess the effect of AE on blood glucose and lipid indexes (triglyceride [TG], total cholesterol [TC], high density lipoprotein cholesterol [HDL-C], low-density lipoprotein cholesterol [LDL-C], TC/HDL-C, fasting blood-glucose [FBG]). Subgroup analyses were performed by duration of intervention (≤2 months, 3 months and 6 months), gender (female and mixed population) and intervention protocols (AE vs. no intervention and AE + diet vs. diet only).
Results: A total of 9 randomised controlled trials with 619 obese or overweight adults were included. Overall analysis showed AE could significantly enhance the decrease of TG level in obese or overweight adults, but not affect the other lipid and glucose indexes. Subgroup analyses showed that AE significantly changed the HDL-C level in female population and when intervention protocol of AE + diet vs. diet only was used. Meanwhile, the FBG level was also significantly changed by AE in mixed population.

* Corresponding author at: Department of Physical Education, Southwest University for Nationalities, No. 16, First Ring Road (Section S.4), Chengdu, PR China. Tel.: +86 021 25076101; fax: +86 021 25076101.
E-mail address: ZhichunZou_z@163.com (Z. Zou).

http://dx.doi.org/10.1016/j.orcp.2015.10.010

Please cite this article in press as: Cai M, Zou Z. Effect of aerobic exercise on blood lipid and glucose in obese or overweight adults: A meta-analysis of randomised controlled trials. Obes Res Clin Pract (2015), http://dx.doi.org/10.1016/j.orcp.2015.10.010

Conclusions: These findings indicated that AE could significantly improve TG, but not TC, HDL-C, LDL-C, TC/HDL-C, and FBG in obese or overweight adults. Meanwhile, gender and intervention protocols may be factors affecting the effect of AE on blood lipid and glucose in obese or overweight adults.

Introduction

In recent years, obesity and overweight have been a serious and common healthy problem worldwide. Also, the number of obesity population continues to increase [1—3]. The obesity would bring more and more burden for their life and health [4,5]. It has been reported that obesity or overweight is the risk factor of cardiovascular diseases [6,7]. Moreover, the blood lipid and glucose indexes are associated with cardiovascular diseases in population with obesity or overweight [8—10]. Thus, it is necessary to find a method for improving the lipid and glucose metabolism in obese and overweight people.

In obese and overweight people, anti-obesity drugs, diet and exercise are the major methods for weight loss [11]. However, it has been found that some anti-obesity drugs can increase the risk of cardiovascular diseases [12]. Thus, diet and exercise intervention are currently popular approach for weight loss in obese or overweight people [13,14]. There are different types of exercises. Among them, the aerobic exercise (AE) and resistance exercise (RE) are commonly used for weight loss [15]. It was reported that AE but not RE reduced the intrahepatic lipid content and visceral fat in obese adolescent girls [16]. For further verifying the metabolic effect of aerobic exercise in obese or overweight individuals, many randomised controlled trials (RCTs) have been performed and assessed the effect of AE on blood lipid and glucose levels [17—20]. Although a previous meta-analysis has reported the effect of AE on blood lipids in overweight and obese adults [21], the controversy still exists among some recent studies [20,22,23]. Thus, we performed this updated meta-analysis to further confirm the effect of AE on levels of blood lipid and glucose indexes in obese and overweight people.

Methods

This study was conducted according to the guidelines recommended by the Primary Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) Statement.

Data sources and search strategies

Studies for this meta-analysis were retrieved from three databases including PubMed, EMBASE and Cochrane library. The literature search was performed up to June 2015, using the following search strategy: (''aerobic exercise'' OR exercise) AND (obese OR overweight) AND random*. In addition, the references in relevant reviews were checked for additional studies.

Definition of AE

AE is defined as any form of physical activity that generates increased heart rate and breath volume to meet the oxygen demands of the muscles being activated [24].

Study selection

The selection of studies was independently conducted by two reviewers (Min Cai and Zhichun Zou). Disagreements were resolved by consulting an expert and discussion based on the suggestions of this expert. The inclusion criteria for study selection were as follows: (1) the studies were RCTs; (2) participants were general population aged larger than 18 years old; (3) participants were obese or overweight individuals with BMI $\geq 25\,kg/m^2$; (4) comparisons of AE vs. no intervention or/and AE combined with other intervention (AE + other intervention) vs. other intervention only were investigated; (5) the mean changes of blood glucose or lipid indexes (such as triglyceride [TG], total cholesterol [TC], high density lipoprotein cholesterol [HDL-C], low-density lipoprotein cholesterol [LDL-C], TC/HDL-C, fasting blood-glucose [FBG]) in each group were reported or could be obtained by calculation. The mean change of each index was calculated as the mean difference of postintervention data − preintervention data.

The studies should be excluded if (1) the studies were not original studies (such as reviews, comments, or letters), (2) they were duplicated publications, (3) there was not data required for meta-analysis, (4) other intervention was included

Please cite this article in press as: Cai M, Zou Z. Effect of aerobic exercise on blood lipid and glucose in obese or overweight adults: A meta-analysis of randomised controlled trials. Obes Res Clin Pract (2015), http://dx.doi.org/10.1016/j.orcp.2015.10.010