

Research Paper

Effect of Eight Weeks of Concurrent Training on Liver Enzymes, Lipid Profile, and Insulin Resistance Among Overweight Male Children



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Parallel exercise training, Lipid profile, Alanine transaminase, Weight loss

ABSTRACT

Aims The aim of this study was to investigate the effect of eight weeks of combined exercise training (aerobic-resistance) on liver enzymes, lipid profile, and insulin resistance among overweight boys.

Methods & Materials Thirty-two healthy overweight boys voluntarily agreed to take part in the study following the related announcement. The overweight children were randomly divided into control (n=16) and experimental groups (n=16). The latter group performed Concurrent training for eight weeks, three sessions per week, on non-consecutive days. In the same way as the experimental group, both before and after the eight weeks of training. In similar conditions, measurement were performed for both experimental and control groups in two stages (i.e. pre-test and after eight weeks of training).

Findings The results of comparing pre- and post-exercise changes in the values for glucose, insulin, ALT, AST, and insulin resistance for the combined exercise training group showed a significant decrease when compared with those for the control group (P<0.05); however, the LDL and HDL values did not change significantly across groups (P>0.05).

Conclusion In general, the results of this study showed that combined exercises (aerobic-resistance), by reducing the rest levels of liver enzymes, glucose, insulin, insulin resistance, and body composition indexes among 11- to 13-year-old boys, tended to be effective in decreasing the risks of being overweight and in preventing such diseases as obesity, diabetes, and non-alcoholic fatty liver disease.

Extended Abstract

1. Introduction

Overweight in children is associated with increased mortality from cardiovascular disease in adulthood [1]. Studies that have examined the effects of physical activity and exercise on body weight and body composition have found similar results, and

most have shown that exercise programs have positive effects on them. Most of these studies have focused on aerobic exercise (for example, running and cycling) and their main goal has been to increase calorie intake [1]. Resistance training also has an important role in increasing muscle mass and improving physical fitness [6]. Woo et al. in a study using a combination of aerobic and resistance exercises showed that these exercises in overweight and obese children aged 9-12 years can reduce waist-to-hip ratio, but the change in body mass index,

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body fat or lean body mass was not very noticeable [4]. Moreover, during one year of exercise, a decrease in body fat was observed in the exercise group who continued their exercise. However, despite the decrease in fat percentage, their weight did not change, which indicates an increase in lean body mass [4]. Combined resistance and endurance training is used as a training method by athletes and non-athletes. Some research has shown that these exercises can reduce body fat mass. The aim of this study was to assess the effect of 8-week concurrent training on liver enzyme levels, lipid profile and insulin resistance among overweight male children.

2. Method

This is a quasi-experimental study conducted in Tehran in 2018. Healthy overweight boys between the ages of 11 and 13 years were invited to participate in the study voluntarily and consciously at school. Prior to the study, the research method was explained to them and then their parents signed an informed consent form. Using Cochran formula, the sample size of 32 was determined and samples were selected based on the inclusion criteria and convenience sampling technique. They were divided into two groups of exercise and control.

3. Results

Participants had body mass index of 23. Their mean age was 11.85 ± 0.7 years in the exercise group and 11.75 ± 0.8 years in the control group, but the difference was not significant ($P=0.64$). Their mean body height was 150 ± 3 cm in the exercise group and 149 ± 3 cm in the control group. Weight, body mass index, fat percentage, waist-to-hip ratio and maximum oxygen uptake of the two groups before and after exercise are presented in Table 1. The results showed that changes in body weight ($t_{18,4}=6.01$, $P<0.001$), body mass index ($t_{18,62}=5.94$, $P<0.001$), fat percentage ($t_{18,62}=5.53$, $P=0.007$) and maximum oxygen uptake ($t_{15,76}=3.37$, $P<0.05$) in the exercise group was significantly higher than in the control group.

4. Conclusion

Combined exercises (aerobic and resistance training), by reducing resting levels of liver enzymes, glucose, insulin, insulin resistance and body composition indices, in 11-13 year-old boys can be an effective strategy to reduce the risks of overweight and prevent some diseases such as diabetes, obesity, and non-alcoholic fatty liver disease. It should be emphasized that, in spite of the significant reduction in many risk indicators, more time should be devoted to performing regular exercises, and a fundamental change

should be made in lifestyle of children, especially in terms of physical activity. In addition, more research is needed on the potential role of a variety of exercise modalities in the prevention and treatment of many metabolic diseases, especially diabetes and non-alcoholic fatty liver, which are prevalent among children.

5. Discussion

The present study had some limitations. For example, it was not possible for us to have an aerobic and resistance groups alone. In general, because this type of exercise used in our study was able to simultaneously increase muscle mass reduce fat percentage (increased muscle mass leads to increased basal metabolic rate, which greatly helps to reduce fat). Also, because of the specificity of the effects of exercise, combining both endurance and resistance training is recommended for optimal physical function and health [20]. Resistance and endurance training are consistent to the extent that the number of endurance training sessions is not reduced.

Ethical Considerations

Compliance with ethical guidelines

This study has obtained its ethical approval from the Research Ethics Committee of Ilam University of Medical Sciences (Code: IR.MEDILAM.REC.1397.030). After explaining the study objectives and method, a written informed consent was obtained from the participants and their parents. They were assured of the confidentiality of their information. They were free to leave the study at any time.

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Authors' contributions

Conceptualization, methodology and initial draft preparation by Shahriar Khajeh Salehani; Conceptualization, data analysis, editing, final draft preparation and supervision by Rostam Alizadeh.

Conflicts of interest

The authors declared no conflict of interest.

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