

The Effect of Twelve Week Aerobic Exercise Programme on Blood Lipids Profile in Obese Girls

^aSandeep M. Chawak, ^bYeshwant V. Patil

^aDayabhai Patel College of Physical Education, Yavatmal, MS, India

^bP.W.S. College, Kamthi Road, Nagpur, MS, India

Abstract

The aim of this study was to investigate the effects of 12 week aerobic exercise program on blood lipids in obese girls. In this study, a total of 40 girls were recruited as exercise group (n = 20) and control group (n = 19). Participants joined sessions for 60 min per day, 3 days per week for 12-week. There were significant differences in weight, body mass index (BMI), high density lipoproteins (HDL), low density lipoproteins (LDL), total cholesterol, and triglyceride between pre-test and post test scores in the exercise group ($p < 0.05$). It was concluded that regular aerobic exercise may affect blood lipids positively in girls. Furthermore, it may result in decreasing obesity in girls.

KEYWORDS: Blood Lipids, Body Mass Index (BMI), Aerobic Exercise, High Density Lipoproteins (HDL), Low Density Lipoproteins (LDL), Total Cholesterol, Triglyceride.

INTRODUCTION

Childhood obesity is an increasing problem in School (Tuna, 2003). Effective early strategies for the prevention of obesity are needed. Although the physical activity is one of the widely accepted strategies for the treatment of obesity; the role of physical activity in the prevention of obesity is still unclear (Steinbeck, 2001). Pediatric obesity tends to be more severe and is associated with more extreme psychosocial and physical morbidity, which may contribute disproportionately to the cost of adult obesity. Earlier prevention strategies for kids may have decrease obesity in their later life (Steinbeck, 2001; Nassis et al., 2005). Obesity is associated with increased systemic blood pressure, decreased aerobic fitness, cardiopulmonary function, increased rate of Type 2 diabetes Mellitus and cardiovascular diseases (Rahmouni et al., 2005; Sorof and Daniels, 2002). Earlier studies showed that highly active children had higher HDL cholesterol and/or lower total cholesterol levels when compared to their inactive peers.

Although there are several reports in the literature regarding the effects of exercise on health related physical components and blood lipids in obese girls (Karacabey, 2009), the effect of exercise on preventing obesity should be highlighted with more specific research. The aim of this study was to examine the effect of 12 week aerobic exercise training on blood lipids in obese girls aged between 10 and 12 years.

METHODS

In this prospective study, the study group consisted of 39 obese girls aged between 10 to 12 years. They were selected from two elementary schools in Nagpur in 2013/2014 season, and were randomly and equally assigned to the exercise (N = 20) and the control groups (N = 19) by using a numbering table for randomization. General physical examination, blood lipid, were testing for all participants both before and after 12 week exercise program. Participants and their parents were informed about this study's aims

and details. Informed consent was given and signed to their parents at the beginning of the study.

Measurements and tools

All the measurements were performed 3 days before the exercise treatment and 2 days after exercise program rest for both (exercise/control) groups.

Height and weight

Height (without shoes) was measured by one investigator to the nearest 0.5 cm with the portable height measure). Weight (in light clothing) was measured to the nearest 0.5 kg on medical scales.

The BMI was calculated as weight/height^2 (kg/m²).

Blood lipids measurements

Blood samples were drawn in a medical center in the morning after participants had their breakfast. Low density lipoproteins (LDL), high density lipoproteins (HDL), total cholesterol (TC) and triglycerides measurements were performed by physicians by using Beckman Coulter STKS device.

Aerobic exercise training

Subjects in the exercise group were performed aerobic exercises at an intensity of 50 to 60% of their target heart rates. Training was performed three days in a week during 12 week each 60 to 90 min period. During the first 5 training days, nutrition knowledge which is about how subjects consume fluid and caloric facts of nutrients was given to all subjects at the beginning of each exercise session. Each exercise class started with 10 to 12 min warming-up exercises and ended with 8 to 10 min cooling down exercises. The exercise intensity and target heart rate was determined by using Karvonen method for each subject individually.

Max. heart rate = 220- age Target HR = %HR (Max HR-Resting HR) + Resting HR.

Subjects in the control group were instructed to continue their normal routine and not participate in any formal exercise program for the duration of the 12-week portion of the study.

Statistical analyses

SPSS 15.0 Statistical package was used for analyzing data. Differences between groups were evaluated with independent t-tests and pre-test and post test differences was compared with paired t-tests ($p < 0.05$).

Table 1. Aerobic exercise program.

| Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-----------------|-------|-------|----|----|----|----|----|----|----|----|----|----|
| TD (min) | 50+20 | 50+20 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 90 | 90 | 90 |
| TI (%) | 20 | 25 | 30 | 35 | 40 | 45 | 45 | 50 | 55 | 55 | 60 | 60 |
| TF | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | | | | | |
|--------|--|--|--|--|--|--|--|--|--|--|--|
| (Dy/W) | | | | | | | | | | | |
|--------|--|--|--|--|--|--|--|--|--|--|--|

TD- Training duration, TI- Training intensity , TF- Training frequency

Table 2. Changes in the parameters of blood lipids in aerobic group and control group.

| Variable | Exercise group (n = 20) | | | Control group (n = 19) | | |
|---------------------------|-------------------------|--------------|------|------------------------|--------------|------|
| | Pre Test | Post Test | P | Pre Test | Post Test | P |
| Weight (kg) | 53.31±10.13 | 50.71±10.84 | 0.00 | 52.65±4.34 | 53.71±4.23 | 0.00 |
| BMI (cm) | 25.91±2.14 | 23.93±2.30 | 0.00 | 26.11±1.36 | 26.24±1.53 | 0.49 |
| HDL (mg/dl) | 43.32±8.40 | 52.61±8.05 | 0.00 | 43.82±4.92 | 41.68±4.48 | 0.00 |
| LDL (mg/dl) | 105.93±21.14 | 92.89±14.12 | 0.00 | 93.17±8.96 | 97.03±10.82 | 0.03 |
| Total cholesterol (mg/dl) | 110.07±39.48 | 95.78±33.04 | 0.00 | 113.96±23.78 | 117.14±24.39 | 0.00 |
| Triglycerides (mg/dl) | 165.82±27.42 | 140.60±21.56 | 0.00 | 150.84±18.03 | 153.52±17.70 | 0.00 |

P<0.01

Results

In the baseline measurements, the mean height of exercise group was 142.84±9.32, while the mean height of control group was 142.00±6.59 (Table 2). Paired sample t-tests results revealed significant differences from pre-test to post-test measurements in the aerobic group for weight, BMI, HDL, LDL, total cholesterol, and triglycerides ($p < 0.001$) scores. In control group, however, there were significantly negative changes in all variables (weight, BMI, HDL, LDL, total cholesterol, and triglycerides).

Discussion

The main finding of this study was that 12 weeks of aerobic training improved impaired LDL, total cholesterol in obese girls. These results were also in line with the previous literature that found improvements in health related parameters of obese participants as a result of regular exercise participation (Haslofça, 2000; Korsten et al. 2007; Steinbeck, 2001; Karacabey, 2009). Moreover, similar results have been reported in adults (Dengel et al., 1998; Wong et al., 2008).

In another study by Nassis et al. (2005), the effect of aerobic exercise training on insulin sensitivity in overweight and obese girls (N = 19) were examined. Body composition and blood lipids and lipoproteins were assessed before and after 12 weeks of aerobic training. They reported that cardiorespiratory fitness increased by 18.8% ($p < 0.05$) as a result of training. They also concluded that 12 weeks of aerobic training improved insulin sensitivity in overweight and obese girls without any significant changes in body weight, body fat percent and circulating concentrations of adiponectin, IL-6, CRP, and other inflammatory markers. In our study, on the

other hand, we found that body fat percentage significantly decreased after 12 weeks aerobic exercise. The reason for this differentiation might be longer duration for exercise application and different population in our study.

Although the majority of studies have found just an inverse relationship between physical activity and body fatness in children, some studies found positive relationships. Saygin and Dukkanci (2009) have clearly documented this inconsistency in the current literature that 78% of studies found that there was negative relationship while 4% of studies found that there was

positive relationship between physical activity level and body fatness. 18% of these studies also found no relationship (Saygin and Dukkanci, 2009).

Conclusion

As a conclusion, it was determined that regular and long term aerobic exercises had positive effects on physical fitness values and blood lipids of obese girls. Moreover, further research is needed to understand the effects of exercise in detail and to alleviate the struggle of obesity in children.

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