Two Modes of Interval Training And Its Impact on Plasma Cholesterol Among Young Boys

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Abstract

The purpose of this study was to find out the impacts of two modes interval training on plasma cholesterol among young boys. For this purpose forty five (n = 45) male students were selected as subjects and their age group ranged between 17 and 21 years. They were divided into three equal groups, each group consisted of fifteen (n = 15) subjects. The group I underwent parcours training (PTG), group II underwent interval training (ITG) and group III acted as a control (CG) which did not engage any special training, except their regular curriculum. The training period for this study was three days in a week for twelve weeks. Plasma cholesterol was selected as a criterion variable of this study and measured by oxides enzymatic method using the Boechringer Mannheim kit. The analysis of covariance (ANCOVA) was applied as a statistical tool. Whenever the F value is found to be significant, Scheffe’s test was applied as a post hoc test to find out the paired mean differences. In all cases 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate. It was concluded from the results of the study that there was a significant improvement (p ≤ 0.05) of the parcours training group and interval training group on total cholesterol as compared to control group and there was insignificant (p ≥ 0.05) difference between two experimental groups.

KEYWORDS: Parcours training, interval training, plasma cholesterol

Introduction

Parcours is a fitness trial and it consists of a path or course equipped with obstacles or stations distributed along its length for exercising the human body to promote good health (Rex, 1985). The parcours features a number of stations (typically 18-20) set along a jogging path with basic equipment, instructions and illustrations to guide exercisers through a solid, full-body workout. A Swiss architect, Erwin Weckemann, invented the first parcours in Zurich in 1968. Parcours soon dotted the European landscape by the hundreds; a fitness trend was born. Peter Stocker (1942-1990), golf icon and Bay Area real estate developer, installed the first U.S. parcours in Mountain Lake Park, San Francisco in 1973. The course is designed to promote physical fitness training in the style attributed to Georges Hébert. In general, fitness trails can be natural or man made, located in areas such as forest, transportation rights-of-way, parks, or urban settings (James, 1988). Equipment exists to provide specific forms of physiological exercise, and can consist of natural features...
including climbable rocks, trees, and river embankments, or manufactured products (stepping posts, chin-up and climbing bars) designed to provide similar physical challenges (Astrand & Kesre, 1970). A typical parcours includes enough spacing between exercise equipment so that participants can do some free running from event to event, and is often built in a circular pattern so that the course can be completed as many times as one wants without ending up at a distance from their starting point.

Interval training consists of activity at high intensity for a period of time, followed by low intensity exercise for a period of time. These 'sets' are repeated. It has been the basis for athletic training routines for years. The first forms of interval training, called "fartlek" involved alternating short, fast bursts of intensive exercise with slow, easy activity. The interval programs of today have become highly sophisticated methods of structured training for athletic performance enhancement (Singh, 1984). Physiologists and trainers have designed interval programs that are specifically suited to individual athletes. These sessions include precisely measured intervals that match the athlete's sport, event and current level of conditioning. Often the appropriate intensity and duration of the intervals is determined by the results of anaerobic threshold testing (AT) that includes measuring the blood-lactate of an athlete during intense exercise (Evylyn, 1989). Interval training works both the aerobic and the anaerobic system. During the high intensity effort, the anaerobic system uses the energy stored in the muscles (glycogen) for short bursts of activity. Anaerobic metabolism works without oxygen. The by-product is lactic acid, which is related to the burning sensation felt in the muscles during high intensity efforts (Gibala, 2009). In the interval method the following characteristics are developed. Activity with pauses of interval of incomplete recovery, medium to high intensity and low to medium volume. Interval training as a programme of repeat running with an interval of restful jogging after each run (Seiler, 2009). The period between run must be long enough the athletes’ complete recovery.

Cholesterol is a fatty substance (a lipid) that is an important part of the outer lining (membrane) of cells in the body of animals (Emma, 2009). Cholesterol is also found in the blood circulation of humans. The cholesterol in a person's blood originates from two major sources, dietary intake and liver production. Dietary cholesterol comes mainly from meat, poultry, fish, and dairy products. Organ meats, such as liver, are especially high in cholesterol content, while foods of plant origin contain no cholesterol (ACSM, 2000). After a meal, cholesterol is absorbed by the intestines into the blood circulation and is then packaged inside a protein coat. This cholesterol-protein coat complex is called a chylomicron (Olson, 1998). The liver is capable of removing cholesterol from the blood circulation as well as manufacturing cholesterol and secreting cholesterol into the blood circulation. After a meal, the liver removes chylomicrons from blood circulation. In between meals, the liver manufactures and secretes cholesterol back into the blood circulation (Tymoczko, 2002). It is a waxy fat like substance that is important for normal body functioning (American Heart Association, 2008). Cholesterol is used for cellular functions and the production of hormones. The liver is the major production factory for cholesterol (about 70%). Diets high
in saturated fats, significantly increase the amount of cholesterol in the blood stream (Wood et al., 1977). Recommended daily intake of fat should not exceed 30% of calories, with a maximum of 10% being from saturated fat (Martin et al., 1977). Elevated total cholesterol is a risk factor for coronary heart disease. The build-up of plaque in the artery may lead to narrowing (high blood pressure) or complete blockage (heart attack) of the vessel. As levels rise above 180 mg/dl, the risk for developing coronary heart disease increases (Superko, 1991).

Materials and method

The aim of this study was to find out the impacts of two modes interval training on plasma cholesterol among young boys. For this purpose, forty five male students studying a bachelor degree in the Department of Physical Education and Sports Sciences, Annamalai University with age group of 17 to 21 years, were selected as subjects. They were divided into three equal groups, each group consisted of fifteen subjects, in which group I underwent parcource training, group II underwent interval training and group III acted as control and they did not take part any special training apart from their daily activity. The training period for this study was three days in a week for twelve weeks. Plasma cholesterol was selected as a criterion variable of this study and it was measured by oxides enzymatic method using the Boechringer Mannheim kit. Parcource is a technique for improving cardiorespiratory endurance that basically combines continuous training and interval training. This technique involves jogging a short distance from station to station and performing a designated exercise at each station according to guidelines and directions provided on an instruction board located at the station. It promoting muscular and cardiorespiratory endurance, continuous training aids in caloric expenditure, a key to proper weight maintenance. The time was increased from forty-five seconds to fifty seconds per station after four weeks. Thorough warm up is very essential before beginning any interval session. Jog (easy) for a couple laps, stop to do some stretching for 5-10 minutes. Take a couple more laps at a bit faster pace, then remove warm-ups just before starting the speed work. After completing the session or that portion of it which you intend to do, run a very slow warm-down mile and stretch a bit more. The data were collected two days before and after the training period.

Data Analysis

Mean and standard deviation were calculated for plasma cholesterol for each training group. And the data were analyzed by using analysis of covariance (ANCOVA). If the ‘F’ value was found to be significant for adjusted post-test mean, Scheffe’s test was applied as a post hoc test to determine the significant difference between the paired mean. Statistical significance was prior to 0.05 levels.
Results and Discussion

Table - I
Analysis of Covariance on Plasma Cholesterol of Parcourse Training Group, Interval Training Group and Control Group

<table>
<thead>
<tr>
<th></th>
<th>PTG</th>
<th>ITG</th>
<th>CG</th>
<th>SOV</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>Mean</td>
<td>164.13</td>
<td>161.87</td>
<td>158.67</td>
<td>B</td>
<td>226.31</td>
<td>2</td>
<td>13.16</td>
</tr>
<tr>
<td>S.D.</td>
<td>11.46</td>
<td>13.68</td>
<td>10.28</td>
<td>W</td>
<td>5938.8</td>
<td>42</td>
<td>141.4</td>
<td></td>
</tr>
<tr>
<td>Post-test</td>
<td>Mean</td>
<td>140.8</td>
<td>141</td>
<td>159.53</td>
<td>B</td>
<td>3472.31</td>
<td>2</td>
<td>1736.16</td>
</tr>
<tr>
<td>S.D.</td>
<td>8.94</td>
<td>7.08</td>
<td>11.59</td>
<td>W</td>
<td>3700.13</td>
<td>42</td>
<td>88.11</td>
<td></td>
</tr>
<tr>
<td>Adjusted</td>
<td>Mean</td>
<td>140.8</td>
<td>141</td>
<td>159.5</td>
<td>B</td>
<td>3343.63</td>
<td>2</td>
<td>1671.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>W</td>
<td>3698.95</td>
<td>41</td>
<td>90.22</td>
<td></td>
</tr>
</tbody>
</table>

*Significant F = (df 2, 42) (0.05) = 3.22; (P ≤ 0.05)  F = (df 2, 41) (0.05) = 3.225;  (P ≤ 0.05)

The table I showed that the pre test mean values on plasma cholesterol for the parcourse training group, the interval training group and control group were 164.13, 161.87 and 158.67 respectively. And the obtained ‘F’ ratio of 0.80 for pre test which was lower than the required table value 3.22 with df 2 and 42 at 0.05 level of confidence on plasma cholesterol. The post test mean values on plasma cholesterol for the parcourse training group, the interval training group and control group were 140.8, 141 and 159.53 respectively. And the obtained ‘F’ ratio of 19.71* for post test which was higher than the required table value 3.22 with df 2 and 42 at 0.05 level of confidence on plasma cholesterol. The adjusted post test mean values on plasma cholesterol for the parcourse training group, the interval training group and the control group were 140.8, 141 and 159.5 respectively. The obtained ‘F’ ratio of 18.53 for adjusted post test which was higher than the required table value 3.225 with df 2 and 41 for significance at the 0.05 level of confidence on plasma cholesterol.

Hence, the results of the study showed that there was a significance difference exists between the parcourse training group, the interval training group and the control group on plasma cholesterol. Further to determine which of the paired means has a significant improvement, Scheffé’s test was applied as a post - hoc test. The result of the follow-up test was presented in Table II.
Table - II

Scheffe’s Test for the difference between the Adjusted Post-Test Mean of Plasma Cholesterol

<table>
<thead>
<tr>
<th>Adjusted Post-test Mean</th>
<th>PTG</th>
<th>ITG</th>
<th>CG</th>
<th>MD</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>140.8</td>
<td>159.5</td>
<td></td>
<td>18.7*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>140.8</td>
<td>141</td>
<td>0.2</td>
<td>8.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>141</td>
<td>159.5</td>
<td>18.5*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .05 levels of Confidence

Table II shows that the adjusted post-test mean difference in plasma cholesterol between parcour training group and control group and the interval training group and control group were 18.7 and 18.5 which were significant at 0.05 level of confidence. The adjusted post-test mean difference between parcour training group and the interval training group was 0.2, which was insignificant at 0.05 level of confidence. Moreover, the result of the study shown that there was no significant difference was occurring between the training groups on plasma cholesterol. It may also be concluded from the result of the study that the parcour training and the interval training groups have a significant improved the plasma cholesterol after their respective training programme.

Discussion

The purpose of this study was to find out the impact of two modes of interval training on plasma cholesterol among young boys. Systematic regular physical activities get beneficial effects to plasma cholesterol (Farrell & Barbieriak, 1980 and Santiago et al., 1987). No previous studies have attempted to find out the impact of two modes of interval training on plasma cholesterol among young boys. Whyte et al. (2010) and Thomas et al. (1984) pointed that interval training improves the plasma cholesterol level. Many studies reported that parcour training helps to normalize the level of plasma cholesterol of human (Williams et al., 1982 and Kokkinos, 1995). Recent studies Gosselin et al. (2011) and Larry et al. (2001) showed that short term interval exercise is beneficial for cholesterol. Endurance training increased HDL-c and decreased LDL-c. (Raz et al., 1985 and Thomas et al, 1985). Both parcour training and interval training are very useful to normalize the plasma cholesterol (Kuno et al., 2012 and Durstine & Haskell, 1994). From this study we can say both training such as parcour training and interval training were very useful to reduce the reduce the level of plasma cholesterol in young boys. The pre, post and adjusted post test mean value on plasma cholesterol of the parcour training group, the interval training group and the control group were graphically represented in figure 1.
Figure 1: The pre, post and adjusted post test mean values of experimental groups and control group on plasma cholesterol

Conclusion

As health and fitness practitioners, designing exercise programs that alter the individual's total cholesterol in a positive way is an important component to be included in program objectives. Physical exercise is the performance of any activity to develop or maintain physical fitness and overall health. Prevailing evidence supports the concept that physical activity can help slow the progression of coronary heart disease (CHD). In summary, total cholesterol can be improved during the age between 17 and 21 years of male youngsters and favour the prescription of parcource and interval training programme during the initial adaptation period. The result of the study indicated that there was a significant improvement on plasma cholesterol due to twelve weeks of parcource training and interval training as compared to control group.

References


