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Influence of Aerobic Training and Selected Asanas Modulates Serum Lipds and Lipoproteins in Young Obese Males

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Abstract

The aim of the study was to analyze the effect of aerobic training and selected asanas on serum lipids and lipoproteins in young obese men. To achieve the purpose, sixty obese male students were selected randomly from different faculties of Annamalai University, and their age ranges between 18 to 25 years. Selected subjects were classified into three groups with twenty members of each. Group 1 served as control, Group 2 act as aerobic training and Group 3 as asanas training group. Exercise training such as aerobic exercise and selected asanas were given to the experimental training groups for a period of three months (4 days/ week) whereas the control group was given no special training other than regular activities. Blood samples were collected before and after the completion of full training course. Biochemical analyses were done on serum lipids (total cholesterol, triglycerides, free fatty acids and total phospholipids) and plasma lipoproteins (VLDL, LDL and HDL) to find out the significant effect of training on obese men. The data were collected and statistically analyzed using ANOVA and DMRT and they are significant at $p<0.01$. The resulted study shows significant changes in the serum lipids and lipoprotein levels in the experimental training groups than control; The study shows that both the training groups produced their effect in modifying the serum lipids and lipoproteins thereby retains the HDL level. It was also revealed that much better effect was seen only in aerobic training group.

Keywords: Obesity, Aerobic training, Asanas, Serum lipids, Plasma lipoproteins

Introduction

Today Obesity has risen dramatically in almost every state, race, age group, and sex over the past twenty years. Becoming nearer to 65% of the American population is either overweight or obese having a BMI of > 25 kg/m2 (Stein C and Colditz , 2004; Ogden et al., 2006).

Obesity is related with a number of adverse health consequences. Higher the body weight prone to a marked increase in morbidity from hypertension, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, certain types of cancers, psychological disorders, as well as increase in all cause mortality (National Heart, L., and Blood Institute).

Obesity is classified into symptomatic obesity, which is caused by different diseases and simple obesity that is caused by the surplus accumulation of fat inside the body. Although there are various causes of simple obesity, genetic and physical constitutional factors, the dietetic factor of excessive calories, and the decrease of activity or lack of exercise, become the major factors in the cause of obesity. Therefore, except for the genetic factor, the imbalance between intake calories and consumption calories can be thought of as the major cause of obesity.

In balancing energy, the lack of physical activity contributes to the major factor of obesity. Moreover, treating obesity is extremely important because if not addressed the risk of cardiovascular diseases and the loss of self-confidence increases. It also degrades the ability of exercise performance as well as mental, emotional and social interaction. As a rule, obesity is a main risk factor for a number of diseases. The etiology of obesity is unclear, although it appears that both genetic and environmental factors contribute to its development (Hanley et al., 1997).

The recommendation to treat overweight and obesity is based not only on evidence that relates obesity to increased mortality but also that weight loss reduces risk factors for disease (Kelley, 2000).

Weight loss, whether by caloric restriction, exercise, or a combination of both caloric restriction and exercise, has been shown to have various positive effects on the human body: improvement on body composition, abdominal adiposity (Hainer etal., 1992; Ross etal., 2000; Williams etal., 1990; Wirth and Steinmetz ,1998), the lipoprotein profile (Wood etal.,1988), and other metabolic variables resulting in improved health. It is clear that exercise carries additional metabolic health benefits whether accompanied by weight loss or not (Janssen etal., 2002). It is also clear that weight loss via diet or exercise can positively influence the lipoprotein profile (Williams etal., 1990).

Increased physical activity has been reported to produce favourable changes in the lipid and lipoprotein Profiles (Wood etal.,1977; Cowan ,1983; Schriewer et al., 1983; Stein etal., 1990). These changes are also influenced by sex, diet, intensity of exercise, body weight and percentage body fat (Haskell 1984; Brownell etal., 1982; Frey etal.,1982; Obregon etal.,1989; Vega et al., 1982).

Yoga, an ancient Indian science has been practiced as a healthy way of life. Recently, yoga has been adopted as an approach to health within alternative medicine (Agte etal., 2008). Modern man is the victim of stress and stress related disorders which threaten to disrupt life totally (Madan and Pal,2002) . Yogic life style, yogic attitudes and various yogic practices help man to strengthen his body and mind.

Living a happy and healthy life on all planes is possible through the unified practice of Sudarshan Kriya Yoga (SKY) along with asana and pranayama when performed consciously and with awareness (Madan and Pal, 2002).Yoga emphasizes on controlled breathing (pranayama), body posture (asana), relaxation of mind (meditation) keeps a person energetic and healthy for maintaining health and fitness and for treating diseases (Madan and Pal, 2002; Agte and Tarwadi , 2004).

Aerobic exercise is believed to reduce the risk of cardiovascular disease partially through increasing serum levels of high-density lipoprotein cholesterol (HDL-C). However, this effect varies considerably among exercise intervention studies.

The objectives of this study are to (1) estimate the minimum amount of exercise required to increase HDL-C level, (2) determine the most effective exercise training group in increasing HDL-C level, and (3) investigate the subjects who most benefit from exercise through increases in HDL-C level and decreases in LDL and VLDL and coronary heart diseases risk factors. Clarifying these issues would help in establishing better exercise programs to achieve better lipid profiles in obese males.

Methodology

Selection of subjects

Sixty obese men were randomly selected as subjects from various faculties of Annamalai University and their age will range between 18-25years. Selected subjects were divided into three groups with twenty members in each.

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Experimental design

The primary purpose of the study was to investigate the effect of aerobic training and selected asana on serum lipids in obese men. The selected subjects were divided into three groups performing aerobic exercise and asana.

Group I acts as **Control Group CG (without training)** who did not participate any special training apart from the regular activities.

Group II – **Experimental group EG1** - starts their workload with 35% of aerobic training and ends with 50% (medium intensity) for twelve weeks (4days/week)

Group III- Experimental group EG2 -served as asanas training group with selected asanas for twelve weeks (4days/week).

Aerobic exercise training and selected asana training programmes were conducted simultaneously in the Department Of Physical Education and Sports Science Annamalai University for a period of 3months (4days/week).

Aerobic exercise training

Aerobic exercises consisted of 45- to 60-minute sessions divided into five stages: warm-up (5 to 10 minutes); principal aerobic activity (10 to 40 minutes); cool-down (3 to 10 minutes); localized work (10 to 25 minutes); and stretching (5 to 15 minutes). During the principal aerobic activity, the intensity of the exercise was controlled by the heart rate, with the target rate being between 140 and 150 beats/min. In each session, the following movements were used: run, stationary run (jog in place), short kick, knee-ups, syncopated leap, alternate leap, jumping jacks, lateral pendulum, marching, the grapevine maneuver and heel touch (Dagoberto Vanoni De Godoy, 2006).

Selected asana exercise

Selected asana includes Suryanamaskar, Tadasana, ParivarittaTrikona-asana, Paschimottanasana, Naukasna, Ardhahalasana, Dhanurasana, Pavanamukthasana, Sarvangasna Ardhakatichakrasana and Bhujangasana (Vivekananda Kendra Prakashan, 2002) were practiced to modify serum lipids (total cholesterol, triglycerides, free fatty acids and total phospholipids). Supervised exercise training programs are also beneficial, especially during the initiation period. They ensure that students are exercising safely, and permit one to assess progress. Biochemical analyses were done and measured using the appropriate test. All the groups were tested before and after the training period of twelve weeks. Extraction of blood and measurement of plasma and serum lipids will be done by the laboratory technicians under the supervision of a biochemist.

Testing variables

Serum lipids such as total cholesterol, triglycerides, freefatty acids and total phospholipids and plasma lipoproteins include LDL, VLDL and HDL measured using appropriate Boehringer- Manheim and other high graded biochemical analytical kit methods. Biochemical analysis was done in the Department of Biochemistry, Raja Muthiah Medical College and Hospital, Annamalai University by the concerned Biochemist and the results were produced by them.

Statistical analysis

Biochemical variables were assessed before and after 3 months of aerobic training and asana practices. The resulted data were collected and analyzed using ANOVA and the group means were compared by Duncan's Multiple Range Test (DMRT). There differences was considered to be significant when $p \leq 0.01$.

Results

Table.1 Changes in the levels of total cholesterol, triglycerides, free fatty acids and total phospholipids in control and experimental groups

Groups	Total cholesterol mg/dl	Triglycerides mg/dl	Free fatty acids mg/dl	Total phospholipids mg/dl
Control	192.4±0.2[a]	131.5±0.05[a]	7.25±0.03[a]	190.8±0.05[a]
Experimental group (EG1) Aerobic training	180.2±0.05[b]	122.25±0.04[b]	6.4±0.05[b]	183.2±0.06[b]
Experimental group (EG2) Asana training	188.2±0.05[c]	125.2±0.05[c]	6.9±0.05[c]	187.2±0.05[c]

Data represents mean± SD from 20 subjects in each group.
Values not sharing a common superscript letter (a,b,c) differ significantly at $p \leq 0.01$ (Duncan's multiple range test)
Group comparison: Group one with all, Group 2 with 3 and 1.
The table value required for significance at 0.01 level of confidence with df 2 and 59 is 1.697

Table.2 Changes in the levels of plasma lipoproteins in control and experimental groups

Groups	LDLmg/dl	VLDLmg/dl	HDLmg/dl
Control	168.2 ± 0.06[a]	40.2 ± 0.04[a]	42.3 ± 0.05[a]
Experimental group (EG1) Aerobic training	155.5 ± 0.05[b]	32.8 ± 0.06[b]	49.2 ±0.05 [b]
Experimental group (EG2) Asana training	161.3 ± 0.05[c]	36.9 ± 0.04[c]	45.5± 0.05[c]

Data represents mean± SD from 20 subjects in each group.
Values not sharing a common superscript letter (a,b,c) differ significantly at $p \leq 0.01$ (Duncan's multiple range test)
Group comparison: Group one with all, Group 2 with 3 and1.
The table value required for significance at 0.01 level of confidence with df 2 and 59 is 1.697

Table 1 shows the significant changes in the total cholesterol, triglycerides, free fatty acids and phospholipids in control and experimental training groups.
Significant decrease was found in serum lipids in aerobic training groups when compared to asana and control. A better result was produced in aerobic group. Table 2 shows the levels of VLDL, LDL and HDL in control and experimental training groups. Significant decrease was found in VLDL, LDL and increase in HDL in aerobic training groups when compared to asana and control. A better result was produced in aerobic group.

Discussions

A daily life pattern of insufficient physical activity can cause obesity, which is a serious worldwide health threat (World Health

Organization 1997). While fat accumulates in any part of the body, the associated risks depend on the area of the accumulation. In particular, fat in the abdominal organs is closely associated with diabetes, cardiovascular diseases and other metabolic diseases (Hunter etal., 1997; Williams et al., 1997). In males, abdominal fat increases with age, and in females, it increases noticeably after menopause (Kotani et al., 1994), and the most important cause of accumulation of visceral fat is the lack of exercise and westernized diet pattern according to the change in lifestyle (Fujioka et al., 1987). Regular exercises helps to strengthen the heart (Narayani and Sudhan Paul Raj, 2010) thereby promotes the muscle mass and maintains the bodyweight (Praveen Ganesan, 2009). Over the past four decades, obesity has been on the rise. Obesity is a chronic disease with a strong genetic component. Obesity can also have a major impact on a woman's fertility. In addition, obese women face major health risks during pregnancy (Althoff, 1988).

In our experimental study, two different types of training such as aerobic and asana exercises were carried out for a period of 12 weeks in obese males. Aerobic and asana exercises given to the specific training group, showed better changes in reducing the cholesterol, triglycerides, free fatty acids and phospholipids, LDL and VLDL and thereby retains the high density lipoproteins in obese males. Resulted study also showed that short term training of 12 weeks aerobic training found to be more effective in reducing the cardiac risk factors and increases the HDL level than asana exercise group.

A study reported that the combined work of yogasana and pranayama in young male students for a period of 12 weeks training showed better effect in reducing cholesterol, triglycerides, LDL, VLDL and blood pressure. It also retained the HDL to normal (Sarvanan etal., 2010). More research illustrates that the practice of yoga was found to be associated with significant decrease in cholesterol among subjects with cardiovascular disease,(Machanda et al., 2000; Mahajan et al., 1999) hypertension (Bijlani et al., 2005)or type 2 diabetes (Agte etal., 2004). In previous studies destine that different intensities of aerobic training programme brings out the deflection in the lipid levels were based on the duration, intensity of training methods and the strain of the subjects in performance (Hartung etal., 1981; Heath etal.,1983). It was found that in recent research on different intensities of aerobic training among coronary heart disease on middle aged obese men determine their effect in reducing the risk factors in medium intensity of aerobic training groups. (Narayanan etal., 2010). However this recent research also supports the present study to derive the better training programme. In our study, we found that 12 weeks of aerobic training at medium intensity significantly reduced the serum lipids and plasma lipoproteins than asana training groups in obese males.

Obesity deteriorates cardiopulmonary function (Jung etal., 2003). However, regular exercise has been reported to improve cardiopulmonary function and reduce the risk factors of cardiovascular diseases (Kemi et al., 2005).

Having high cholesterol can cause life-threatening diseases. However, it can be controlled through diet and exercise. When there is high cholesterol, the HDL and LDL cholesterol levels are reversed making LDL level higher than HDL level. High-density lipoprotein makes up HDL cholesterol levels and is also known as the good cholesterol. HDL fights against plaque buildup in arteries, so promoting the increase of HDL and can help improve blood circulation (www.nutralegacy.com.2009). HDL cholesterol restricts the growth of LDL cholesterol and moves the LDL from the arteries to the liver. This reduces the chances of blockage of arteries, which causes strokes or heart diseases. High level of blood cholesterol is a contributory factor of atherosclerosis and many lipid associated ailments like obesity, heart attacks and stroke and kidney failure. Studies have shown that lipid associated disorders are not only attributed to the total serum cholesterol, but also to its distribution among different lipoproteins. The low-density lipoproteins (LDLs) are the major carriers of cholesterol towards tissue having atherogenic potential, while the high density lipoproteins (HDLs) carry cholesterol from peripheral tissues to the liver. The HDLs thus give protection against many cardiac problems and obesity. (Kitamura, 1994). Numerous studies have examined the effect of aerobic exercise through exercise training. In the study reported by An et al., in obese type 2 diabetes patients who performed aerobic exercise of low intensity at 25 - 39% of the maximal heart rate for 60 minutes, 5 times per week and for 12 weeks, the body fat index was lowered, and cardiopulmonary function was improved (An KH, 2005). Studies also showed that intense aerobic exercise has been shown to reduce cholesterol concentration and to increase high density lipoprotein (HDL) concentration (Hartung etal., 1981;Heath etal., 1983) and exercise training after myocardial infraction has resulted favourable lipoprotein changes.(Ballantyne etal., 1982) In our study aerobic training was given to the obese male subjects performed with medium intensity showed their moderations in lipids, decrease in body fat and maintains the normal metabolic functions and keep away the risk factors of cardiac diseases. We also found that compared to asana group of training, aerobic training groups gains better effect in modulation of the lipid levels. Since so many studies were conducted with different means of training exercises to diminish the lipid levels and showing their effects in support to the present study. From our study, it is revealed that no other research by undergoing comparative studies have shown such an improvement in 12 weeks of training at a shorter duration, at less strain in medium intensity in obese people. Thus in our study the clear picture is viewed overall resulted and clarified the issues in determining aerobic exercise as an ideal training program in gaining the effect on lipid profiles. The study determines the 'Aerobic exercise' as most effective exercise training group in increasing HDL-C level, and investigates the subjects who most benefit from exercise through increases in HDL-C level and decreases in LDL and VLDL and coronary heart diseases risk factors. Clarifying these issues help in establishing better exercise programs to achieve better lipid profiles in obese males. Aerobic training is the best part of our life training programme to emphasize our life style. Hence the study reinforces the idea that aerobic exercise is an important nonpharmacologic intervention for improving selected CHD risk factors and in diminishing the obesity in people.

Conclusion

The training programs used in this study produced significant benefits on reducing TC, TG, FFA and phospholipids and plasma lipids includes LDL-VLDL C, and retains the HDL level in a short term period. Accordingly, the results of the current study suggest that aerobic-based training programme is found to be better than asana training group. It strengthens the muscle mass and thereby controls the weight gain. It is also suggested that even though more fitness programme are invented but higher the benefits were seen only in aerobic training people. Obesity is declined in aerobic exercises because of the merits found. Aerobic exercise was trained in all age groups and is enough to positively influence the metabolic health indicators of sedentary older women and men.

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