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EFFECTS OF PHYSICAL CONDITIONING IN IMPROVING HIGH DENSITY LIPOPROTEIN CHOLESTEROL (HDL-C) LEVEL AMONG TRAINED AND UNTRAINED WOMEN

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Abstract:
The intention of this investigation was to assess the effects of physical conditioning in improving High Density Lipoprotein Cholesterol (HDL-C) level among trained and untrained women. The study was delimited to twenty trained and twenty untrained women from the inhabitants of Ongole, Andhra Pradesh, India. They were further sub-divided into experimental and control group of 10 subjects in each category. The subjects were of the age group of 22 to 25 years. The duration of the training period was restricted to twelve weeks and the number of sessions per week was confined to six. High density lipoprotein cholesterol level was selected as dependent variable and assessed during pre and posttest by standard test and procedure. Three-way analysis of variance was used to find out the influence of each factor independently. Due to the effect of physical conditioning the high-density lipoprotein cholesterol level of trained and untrained groups subjects were significantly increased. The result of the study also indicates that, significant differences exist among trained and untrained women irrespective of groups and tests, significant differences exist between experimental and control groups irrespective of category and tests, significant differences exist between pre and posttests irrespective of category and groups on high density lipoprotein cholesterol level.

Keywords: physical conditioning, high density lipoprotein cholesterol, trained and untrained women

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1. Introduction

The sedentary way of life had negative effect on human body and has been associated with many serious health problems. A harmoniously developed well-coordinated body is an asset to the individual and to the nation. A fit nation is an asset and a weak nation is a liability. Every nation tries to forge ahead following its sacred culture and tradition (Hocky, 1989).

Appliances like television, computer and the like have ensured that we do not have to leave our sofa to seek entertainment. People have become lazy and with the advent of modern home appliances there is no need for hard or even moderate physical work. This is a serious threat to the normal function of our body and is the cause of modern-day illness like heart attack, obesity, and diabetics. Formerly these diseases that were found only among elderly are now common in the young and middle-aged people. The people of this age are striving hard to make their life easier. There is an increase in the mental stress and strain as never before. People are mentally unhealthy and are unequipped to cope with present day problems.

Fitness is the ability of the individual needed to live a full and balanced life. The totally fit person has a healthy and happy outlook on life. All living individuals have some degree of physical fitness. This degree may be interpreted in terms of their capacity for performance and their endurance in physical activity. Fitness is the man's absolute necessary. It breads self-reliance and keeps man mentally alert. This is also essential at all times to make a success in any activity. Physical fitness is an important phenomenon for any human being to lead a life of easy and comfort. Physical fitness develops the organic fitness. It means the efficient of organic system of the human body circulatory, respiratory systems etc.

Physical fitness is fundamental importance to all human beings. A man cannot move even an inch without proper amount of physical fitness. Many prominent people in the field of medicine and in other fields have spoken and written about the need for exercise to maintain an organically sound body from birth to old age. Functioning of the body requires energy, which depends on the ability of the heart, lungs and blood vessels to process oxygen and deliver it to the muscles, where it becomes the fuel for energy.

Much evidence now suggests that higher HDL cholesterol levels are associated with a lower risk of heart disease, and that low HDL cholesterol levels are associated with an increased risk of heart disease. Thus, HDL cholesterol appears to be "good." Many people don't like to hear it, but regular physical exercise may be the most effective way to increase HDL levels. Recent evidence suggests that the duration of exercise, rather than the intensity, is the more important factor in raising HDL cholesterol. Hence, exercise habits should be maintained year-round, year after to keep the benefits. This may look like an impossible task with personal effort needed for out weighting the possible reward. But once a regular pattern of exercise is established, activities become easy and natural. In fact, many people don’t maintain their regular level of exercise (Vodak, 1995).

Though physical conditioning develops most of the components of fitness, it is expected that it will have an effect on bio-chemical parameters. Some modern texts seem to indicate that physical conditioning will strengthen all organs and all physiological functions of the body. Research work on the development and maintenance of physiological functions of human beings is an important area which requires a lot of investigation. By considering the above literature, in this study, an attempt has been made to analyze the effects of physical conditioning in improving High Density Lipoprotein Cholesterol **(**HDL-C) level among trained and untrained women.

2. Methodology

2.1 Subjects and Variables

The study was delimited to twenty trained and twenty untrained women from the inhabitants of Ongole, Andhra Pradesh, India were selected as subjects. They were further sub-divided into experimental and control group of 10 subjects in each category. Subjects were free from any known disease. All untrained participants had not exercised on a regular basis for at least one year. The investigator selected High Density Lipoprotein Cholesterol **(**HDL-C) as dependent variable and it was assessed by blood analysis in the bio-chemistry lab.

2.2 Training Protocol

The duration of the study was restricted to 12 weeks and the number of sessions per week was confined as six. The subjects of both trained and untrained groups performed physical conditioning with moderate intensity. The intensity of the training was fixed according to the consideration of the heart rate of the individuals. The participants were continued their practice for forty minutes duration and they were gone for walking in between the rest period for relaxation. The intensities and the load of the training were increased, according to the adaptation conditions of the subjects. After each three weeks the intensity of the experimental groups was increased.

2.3 Statistical Procedure

The experimental design used was the $2 \times 2 \times 2$ factorial design. The first factor consists of trained and untrained women and the second factor consists of groups (Experimental & Control) and the third factor consists of "test" measured at 2 different times (pre & post). Three-way analysis of variance was used to find out the influence of each factor independently and also their combined influence.

3. Results

The descriptive analysis of the pre and post test data showing mean and standard deviation and 'T' ratio on high density lipoprotein of trained and untrained women of experimental and control groups are presented in Table 1.

Table 1: Descriptive Analysis of the Data and 'T' Ratio on High Density Lipoprotein of Trained and Untrained Women of Experimental and Control Groups

Category	Group	Test	Mean	Standard Deviation	Mean Differences	'T' ratio
Trained	Experimental	Pre test	50.10	1.16	2.30	15.05*
		Post test	52.40	1.57		
	Control	Pre test	50.70	1.33	0.90	1.37
		Post test	49.80	1.19		
Untrained	Experimental	Pre test	41.40	0.96	2.00	13.41*
		Post test	43.40	1.07		
	Control	Pre test	41.70	1.05	0.60	1.03
		Post test	41.10	1.10		

*Significant at 0.05 level.
The table value required for significant for df 9 is 2.26.

Table 1 shows that the pre-test and posttest mean and standard deviation values on high density lipoprotein of trained category experimental group are 50.10 $\pm$ 1.16 and 52.40 $\pm$ 1.57 and untrained category experimental group are 41.40 $\pm$ 0.96, 43.40 $\pm$ 1.07 respectively. The obtained 't' ratio values 15.05 and 13.41 of trained and untrained category experimental groups are higher than the table value 2.26 required for significance at 0.05 level for df 9. Hence, it is concluded that due to the effect of physical conditioning the high-density lipoprotein of trained and untrained groups subjects was significantly increased.

Table 1 also shows that the pre-test and posttest mean and standard deviation values on high density lipoprotein of trained category control group are 50.70 $\pm$ 1.33 and 49.80 $\pm$ 1.19 and untrained category control group are 41.70 $\pm$ 1.05 and 41.10 $\pm$ 1.10 respectively. The obtained 't' ratio values 1.37 and 1.03 of trained and untrained category control groups are lesser than the table value 2.26 required for significance at 0.05 level for df 9. Hence, it is concluded that the pre and posttest values on high density lipoprotein of trained and untrained category control groups did not differ significantly.

The pre and post test data showing mean value on high density lipoprotein of trained and untrained category experimental and control groups are represented in Figure 1.

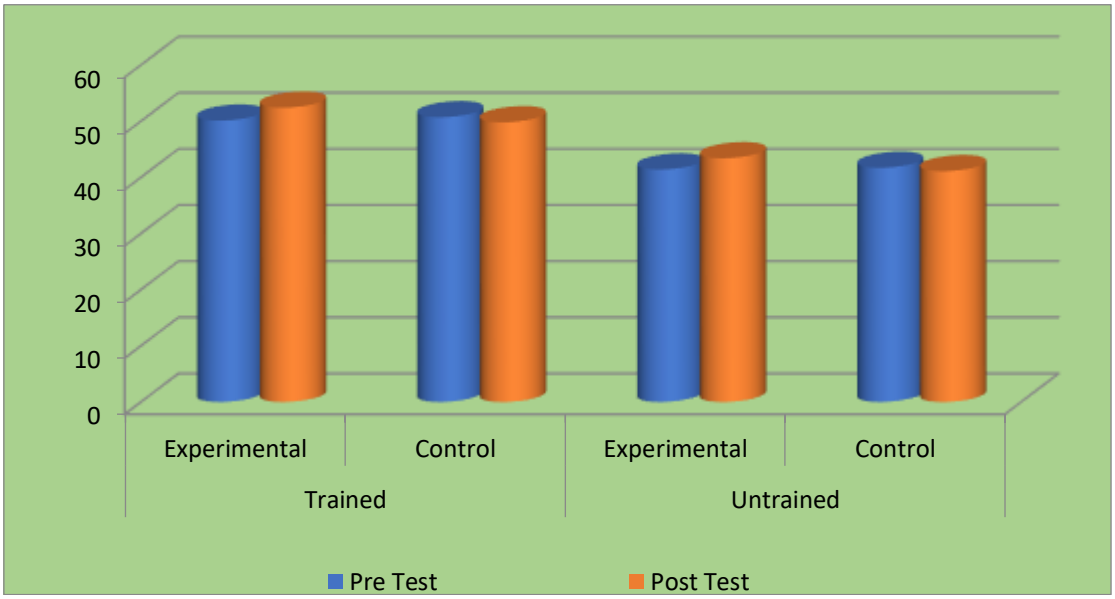

Figure 1: Pre and Post Test Mean Value on High Density Lipoprotein of Trained and Untrained Category Experimental and Control Groups

The three-factor factorial analysis of variance on high density lipoprotein level among trained and untrained women category experimental and control groups at pre and posttest have been analyzed and the obtained results are presented in Table 2.

Table 2: Three Factor Factorial Analysis of Variance on High Density Lipoprotein

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
A factor (Category)	1557.61	1	1557.61	940.05*
B factor (Group)	21.01	1	21.01	12.68*
C factor (Test)	9.11	1	9.11	5.50*
AB factor (Category & Group)	0.013	1	0.013	0.008
AC factor (Category & Test)	0.015	1	0.015	0.009
BC factor (Group & Test)	43.51	1	43.51	26.26*
ABC factor (Category & Group & Test)	0.61	1	0.61	0.37
Error	119.30	72	1.65	

Note: Table values required for significance at 0.05 levels with df 1 and 72 is 3.96.

Table 2 shows that the obtained 'F' ratio for Factor- A (Category) is 940.05, which is greater than the table value of 3.96 with df 1 and 72 required for significance at .05 level of confidence. The result of the study indicates that, significant differences exist among trained and untrained women irrespective of groups and tests on high density lipoprotein.

The obtained 'F' ratio for Factor- B (Group) is 12.68, which is greater than the table value of 3.96 with df 1 and 72 required for significance at .05 level of confidence. The result of the study indicates that, significant differences exist between experimental and control groups irrespective of category and tests on high density lipoprotein.

The obtained 'F' ratio for Factor- C (Test) is 5.50, which is greater than the table value of 3.96 with df 1 and 72 required for significance at .05 level of confidence. The result of the study indicates that, significant differences exist between pre and posttests irrespective of category and groups on high density lipoprotein.

The obtained 'F' ratio for AB factor (Category & Group) and AC factor (Category & Tests) are 0.008 and 0.009 respectively, which are lesser than the table value 3.96 required for significance with df 1 and 72 at .05 level of confidence. It pointed out that, insignificant differences exist between these factors on high density lipoprotein. However, significant differences exist between groups and tests on high density lipoprotein since the obtained 'F' ratio value (26.26) for BC factor (Groups & Tests) is greater than the require table value.

The obtained 'F' ratio value of Interaction (Category & Group & Test) is 0.37, which is lesser than the table value 3.96 required for significance. The result of the study shows that insignificant difference exists among trained and untrained category experimental and control groups at different stages of testing on high density lipoprotein.

4. Discussion

Slentz, et al. (2007), in their study, showed that physical inactivity has profound negative effects on lipoprotein metabolism. Modest exercise prevented this. Moderate-intensity but not vigorous-intensity exercise resulted in sustained VLDL-triglyceride lowering. Thirty minutes per day of vigorous exercise, like jogging, has sustained beneficial effects on HDL metabolism.

Ades and Poehiman (1996) who studied the effects of numerous intervention trials in young subjects, suggest that aerobic exercise training exerts favourable effects on specific lipid sub fractions, in particular high-density lipoprotein (HDL) cholesterol. Bonettle et al. (1995) suggest that exercise induces changes in the lipoprotein (a) in an untrained healthy individual. Increased physical activity induced a number of positive changes in the metabolism of lipoproteins. Triglycerides were lowered when the high-density lipoprotein is increased. These above findings were supported by the study of Kin Jsier et al. (2001); Leon and Sanchex (2001), Leaksonen (2000), Lemura, Khare, Manchanda et al. (2000); Damodaran et al., (2002); Mahahan et al. (1999) and Schmidt (1997).

Walking program improved the high-density lipoprotein cholesterol (Ready et al., 1995; Irwin (2003); Fujino et al. (2002). According to Suter et al., (1990) jogging improved the high-density lipoprotein cholesterol. Jafari et al., (2003) and Marti (1990) found that jogging improved the high-density lipoprotein cholesterol. Altena et al. (2006) reported that 4 weeks of aerobic exercise training significantly increased HDL-C. The possible reason for the elevation in HDL-C is exercise training (Heitkamp et al., 2008).

Tokmakidis and Volaklis (2003) emphasize that although regular exercise training has beneficial effects on blood lipid profiles, a period of detraining as little as three months can offset all the advantages gained during training and reverse the beneficial

effects of regular exercise training, thus underscoring the need for uninterrupted regular exercise throughout life. Hence, it is concluded from the results of the study that systematically and scientifically designed physical conditioning may be given due recognition and be implemented properly and regularly in order to improve the health condition of the women.

5. Conclusions

Due to the effect of physical conditioning the high-density lipoprotein cholesterol level of trained and untrained groups subjects were significantly increased. The result of the study also indicates that, significant differences exist among trained and untrained women irrespective of groups and tests, significant differences exist between experimental and control groups irrespective of category and tests, significant differences exist between pre and posttests irrespective of category and groups on high density lipoprotein cholesterol level. The result of the study shows that insignificant difference exists among trained and untrained category experimental and control groups at different stages of testing on high density lipoprotein cholesterol level.

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