



Effect of Physical Fitness Schedule on Lipid Profile and Body Fat

KEYWORDS

Physical fitness schedule, Lipid profile, % body fat

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ABSTRACT Coronary heart disease (CHD) is the greatest killer of human being in modern age. It causes 25% to 35% deaths in most of the developing countries. In India deaths due to CHD is increased from 1.17 million in 1990 to 1.59 in 2000 and is expected to be 2 million by 2010.

The main cause of CHD is atherosclerosis of vessels and the risk factors are high levels of total cholesterol (TC), triglycerides (TG), low density lipoprotein cholesterol (LDL-C), very low density lipoprotein cholesterol (VLDL-C) and low level of high density lipoprotein cholesterol (HDL-C). The studies have shown that physical exercise performed regularly is effective in lowering level of TC, TG, LDL-C, VLDL-C and raising the HDL-C. So the present study was planned to assess the serum lipid profile and percentage of body fat before starting of physical fitness schedule (aerobic & anaerobic exercises) & 3 months after completion of it in adult females. In the study 32 adult females between the age group of 21-25 yrs were considered for study having no major illness before and during the study and those were non-smokers, non-alcoholic, and non-tobacco users.

The study is ethically cleared and approved by institutional ethical & research committee. The TC, TG, LDL-C, VLDL-C, HDL-C, levels and % body fat was estimated manually and the data was analysed statistically by using paired "t" test. In our study, it is observed that there is highly significant decrease in TC ($P < 0.001$), TG ($P < 0.001$), LDL-C ($P < 0.001$), VLDL-C ($P < 0.001$) & % body fat. Highly significant increase in HDL-C ($P < 0.001$), HDL/TC ($P < 0.001$). From our study we concluded that the physical fitness schedule lowers the risk factors of CHD.

AIMS & OBJECTIVES

- To compare serum lipid profile before starting of physical fitness schedule and 3 months after completion of physical fitness schedule in young adult females.
 - It includes :
 - Total cholesterol
 - Total triglycerides
 - High density lipoprotein cholesterol
 - Low density lipoprotein cholesterol
 - Very low density lipoprotein cholesterol
 - Ratio of HDL-C/TC
- To compare percentage (%) body fat before starting of physical fitness schedule and 3 months after completion of physical fitness schedule in young adult females.

MATERIALS AND METHODS

The present study was conducted in 32 healthy adult females. The subjects were from "M.N.S Chandrasekhar Agashe College of physical education, Pune. They were students of B.Ed (Physical education) 2005-2006 batch.

1. Criteria for selecting subjects

- * Age group between 21-25 years.
- * On medical examination, no obvious cardiovascular & respiratory abnormalities.

2. Exclusion criteria:

Smokers, tobacco chewers, alcoholics were excluded from the study.

The topic is ethically cleared and approved by institutional ethical and research committee.

The physical fitness schedule included aerobic exercise/ games (like running, volleyball, handball, basketball, football, kho-kho, cricket) & anaerobic exercise/ games (like long jump, high jump, weight lifting).

METHODS

Estimation of total cholesterol and HDL-C by (CE-CO-PAP) method (By Cholesterol esterase; cholesterol oxidase and peroxidase method).

i) Manual method for estimation of total cholesterol :

Pipette into 3 test tubes	Blank(ml)	Std(ml)	Test(ml)
Cholesterol Reagent no 1	1.00	1.00	1.00
Distilled water	00.2	-	-
Std reagent no 3	-	0.02	-
Sample	-	-	0.02

The reagents were mixed well and incubated at 37 degree C for 10 minutes or 15 minutes at 30 degree C +/- 5 degree C.

After incubation it was read at 530 nm (500-540) in colorimeter.

With the following formula; the value of total cholesterol in mg % was calculated.

Calculation:

Total cholesterol in mg %

$$= \frac{\text{O.D. test} - \text{O.D. Blank}}{\text{O.D. std} - \text{O.D. Blank}} \times 200$$

(O.D. = Optical density)

B) Manual method for estimation of HDL cholesterol.

Step I:

Serum 0.2 ml; HDL reagent 0.05 ml.

Mixed well for 10 minutes and centrifuged. Clear supernatant was separated and cholesterol level of the supernatant was

estimated as given in Step II.

Step II:

Pipette into 3 test tubes	Blank(ml)	Std(ml)	Test(ml)
cholesterol reagent no 1	1.00	1.00	1.00
HDL reagent	0.10	0.10	-
Supernatent from step I	-	-	0.10
Cholesterol std (200 mg %)	-	0.02	-

The reagents were mixed well ,incubated at 37 degree C for 10minutes or 15 minutes at 30 degree C+/- 5 degree C.After incubation it was read at 530nM (500-540) in colorimeter .

Calculation:

$$\text{HDL cholesterol in mg\%} = \frac{\text{O.D HDL-O.D HDL Blank}}{\text{O.D HDL std-O.D HDL Blank}} \times 50$$

(O.D. =Optical density)

Estimation of TG by GPO-PAP End point method (Glycerol-3-phosphate oxidase; peroxidase method).

Manual method for estimation of TG(Triglycerides):

Pipette into 3 test tubes	Blank(ml)	Std(ml)	Test(ml)
Distilled water	0.05	----	----
Std reagent no 3	-----	0.05	-----
Sample	-----	-----	0.05
Working reagent	1.00	1.00	1.00

The reagents were mixed well and incubated at 37 degree C for 10minutes.It was read at 530 n M(480-540n M) in colorimeter .

Calculations:

$$\text{TG In mg \%} = \frac{\text{O.D. test}}{\text{O.D. std}} \times 200$$

O.D. (Optical density)

Estimations of other fractions of lipid profile:

With the help of following Friedewald's formula LDL and VLDL levels were estimated.

- LDL (mg %) =TC (mg %)-[HDL (mg %) +VLDL (mg %)
- VLDL (mg %) =TG (mg %) /5.

2) Evaluation of percentage of body fat

- It was measured by using Bioelectric Impedance Analysis (BIA) Technique. At best the technique of BIA is noninvasive, indirect, relatively easy means for providing a general assessment of body composition.
- In our study we have used instrument manufactured by Omron Company. To find out percent body fat following steps were performed.
- To feed the data to instrument i.e age, gender, height (meters), weight (kg).
- To hold it with both the hands for few seconds. Then the value of percent body fat was recorded digitally.

OBSERVATIONS

TABLE: 1

LIPID PROFILE at the time of admission & 3 months after completion of physical fitness schedule in FEMALES.

	At admission		After 3 months		t	Significance
	MEAN	S.D	MEAN	S.D.		
Total cholesterol (mg/dl)	204.28	26.67	165.75	24.31	9.58	P<0.001 HS
HDL -C(mg/dl)	51.84	12.46	55.87	13.08	3.77	P<0.001 HS
Total TG (mg/dl)	111.25	29.08	79.65	17.52	5.86	P<0.001 HS
LDL- C	130.18	31.45	93.94	26.84	8.28	P<0.001 HS
VLDL C	22.25	5.81	15.93	3.50	5.31	P<0.001 HS
HDL/TC	0.2608	0.0819	0.3433	0.0888	9.16	P<0.001 HS

Table: 1 shows statistically highly significant decrease in total cholesterol, TG, LDL-C, VLDL-C & highly significant increase in HDL-C, HDL/TC 3 months after completion of physical fitness schedule in FEMALES

TABLE: 2

Percentage body fat at the time of admission & 3 months after completion of physical fitness schedule in FEMALES.

	At admission		After 3 mths		t	Significance
	MEAN	S.D	MEAN	S.D.		
Body fat (%)	26.59	5.10	22.43	6.10	5.78	P<0.001 HS

TABLE:2 shows statistically highly significant decrease in body fat(%) 3 months after completion of physical fitness schedule in FEMALES.

DISCUSSION

In our study it was found that in females there was decrease in TC, TG, LDL-C, VLDL % body fat and increase in HDL cholesterol, HDL/TC ratio. These changes in values are statistically highly significant.

EFFECT OF EXERCISE ON LIPID PROFILE:

- Combustion of fat produces energy 9.4cal/g.Free fatty acids are the main source of energy during the exercise. Glucose contributes only 10-15% while fatty acids about 70-90%.Fat stores have enough potential energy to keep a sportsman to continue physical activity. The greater energy yield of fats (double that of glucose-4 cal/g) ensures that it can meet the demands of exercising muscles.
- During exercise there is more lipolysis as result of release of different hormones.Because of more lipolysis more free fatty acids are now available to supply energy for exercising muscles. So there is reduction in % body fat.

CONCLUSION

Physical fitness schedule (combination of aerobic and anaerobic exercise/games) causes:

- Highly significant decrease in total cholesterol, triglycerides, low density lipoprotein cholesterol, very low density lipoprotein cholesterol.
- Increase in high density lipoprotein cholesterol
- Increase in ratio of HDL-C/TC level.
- It also caused decrease in % body fat

These beneficial effects of exercise are used as primordial in prevention of atherosclerosis which is the most important cause of deaths in adults due to CHD.

Thus, the combination of aerobic and anaerobic exercise is more beneficial than the restricted variety of exercises (either aerobic or anaerobic). Instead of following only one type of exercise combination of aerobic and anaerobic exercise is more beneficial and hence should be recommended.

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