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Research Article

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Aerobic Exercise Improves Lipid Levels of Normal and Obese Subjects

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ABSTRACT

Obesity is becoming a serious Global Public Health Issue especially in developed countries as well as developing countries.Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. Once considered a problem only in high income countries, overweight and obesity are now dramatically on the rise in low- and middle-income countries, particularly in urban settings. ailment. A growing body of evidence indicates that obesity is associated with wide range of health conditions including respiratory diseases such as COPD and asthma. It can cause serious health problems that are indisputable. Nowadays, obesity is the worrying factor due to sedentary lifestyle and bad eating habits. Dietary and lifestyle practices are directly related to obesity, the most important cause in imbalance between the energy intake and output.

Keywords: *obesity, aerobic exercise, lipid profile, BMI.*

INTRODUCTION

Aerobic exercise is defined as any rhythmical activity that causes a sustained increase in heart rate, respiration and muscle metabolism[1]. Aerobic exercise means exercise with oxygen. This method of exercise include activities such as jogging, swimming, bicycling, walking, running in place and jumping rope. It also includes other rhythmical movement of body along with music as well as activities performed with various equipments[8]. Aerobic exercise is better than any other physical exercise because it is steady and continuous over a period of time. It is advisable for not only obese but because of its innumerous positive effects, it is advisable to normal weight individuals also. Regular activity coupled with restricted diet is the most effective way to loose weight because the body becomes more efficient.

Obesity, defined as an excess of body weight relative to lean body mass, is the consequence of a chronic imbalance between energy intake and energy expenditure. In India, from last two three decades main emphasis was being given on under nutrition, but now a days societies are becoming more sedentary, more specialized and more prosperous as a result, an excessive accumulation of body fat tend to be more prevalent[5]. Hence, the attention of scientist is being shifting from under nutrition to over nutrition, another profile of malnutrition.

For weight, reduction, regular exercise with optimal dietary intake is ideal for the best results. A number of exercises can be performed, but in recent years aerobics is gaining popularity for maintaining for good health. Therefore, in view of importance outlined above, this study was designed to determine the effect of aerobic exercise on BMI & lipid profile of normal and obese subjects.

MATERIALS AND METHODS

A total of 80 subjects of age 20 to 40 yrs, in which 40 each from normal and obese groups were included in such a way that in each group number of males & females was equal. Subjects were divided into obese (BMI >25) & normal (BMI – 18.5 to 25) on the basis of BMI.

This study was conducted in the selected health centers at Sri Ganganagar district of Rajasthan., India Two out of three health centers located in Sri Ganganangar district were selected using following criteria:-

A) Attendants were both males and females.
B) Similarity in type and durations (45min) of exercise schedule.
C) Trained personel was engaged in conducting aerobic classes.

Sampling Specifications

Sample size : Forty subjects each from normal and obese groups were included in the sample in such a way that in each group number of males and females was equal. The size of whole study was eighty.

Sample Age : For the present investigations, obese and normal adults, belonging to the age group of 20-40 years, of both the sexes, that is, obese male (OB), obese female (OF), normal male (NM), normal female (NF), constituted the population.

Sampling Technique: Purposive sampling technique was used to select the population.

The inclusion criterion was under-

a) Only novice cases were considered to avoid any earlier impact of Aerobic exercise.
b) These likely to attend aerobic classes regularly at least for a period of one month were included.
c) BMI was taken as one of the prime criteria for selection of obese & normal subjects.
d) Willingness of the subjects to participate and cooperate during the course of study was ensured.

ASSESSMENTS: Anthropometric (n=80) and Biochemical assessments (n=40) were done at baseline and after one and two months of aerobic exercise.

RESULTS AND DISCUSSION

After 60 days, aerobic exercise brought about an observable improvement in obese subjects in respect to their BMI & Lipid profile by reducing & bringing these values much nearer to safe limits. A discernable difference was observed in TC, LDL-C, and HDL-C, TG levels within obese males, normal male & obese females at 0, 1 & 2 months. A desirable increase in HDL-C levels of study subjects was also observed after two months of aerobics.

Body Mass Index (BMI) – It is a measure of obesity, has been proved useful & clinically applicable. The declining trend of average BMI proved the significant role that Aerobic exercise played in it. It is in line with the report of studies carried out a Ken Cooper's Aerobic Institute, where lowering of body fat by regular exercise was observed.

Table–(1) Effect of Aerobics on average Body mass index (kg/m^2) of normal and obese subjects

S. No.	Group	Zero Month n=80	One month n=80	Two Month n=30	to-1	t1-2	to-2
1	Obese Male	30.07	28.01	27.58	14.89**	8.00**	9.27**
2	Normal Male	22.61	22.19	22.65	2.097*	0.797NS	0.466NS
3	Obese Female	31.09	28.57	26.16	8.10**	13.00**	13.06**
4	Normal Female	20.72	20.97	21.29	-0.983NS	3.026NS	3.477NS
	SEm	0.891	0.764	0.649			
	CD 5%	2.508	2.151	2.09			
	CD 1%	3.328	2.853	2.878			
	CV %	10.78	9.68	7.689			

* Significant at 5% level
* * Significant at 1% level
NS Non significant

Further in present study the difference between body mass index of obese and normal subjects of either sex with respect to all these consecutive readings i.e. at zero, one and two months, was found to be significant. On sex wise analysis of obese subjects, it was found that females could reduce relatively more weight probably due to more weight consciousness and adherence to modified dietary regime coupled with regular exercise.

Interestingly, after completion of two months of exercise, a slight but non observable increase in average BMI was observed in case of normal subjects which indicates that Aerobics is beneficial not only in weight reduction but also for gaining weight for extremely lean and thin individuals.

LIPID PROFILE: Analysis of variance reveals a significant difference in the average cholesterol, low density lipoprotein, high density lipoprotein and triglycerides levels of the subjects belonging to different groups whereas in case of very low density lipoprotein the difference was found to be non-significant.

Table–(2) Effect of Aerobics on average serum cholesterol (mg/dl) and average Serum Triglycerides (mg/dl) of normal and obese subjects

S. No.	Group	Average serum cholesterol (mg/dl)					
		Zero Month n=40	One month n=40	Two Month n=24	to-1	t1-2	to-2
1	Obese Male	229.97	215.35	207.6	8.23**	5.45**	7.07**
2	Normal Male	218.78	194.22	191.52	3.16*	4.74**	6.89**
3	Obese Female	215.96	205.24	200.54	6.875**	5.493**	6.96**
4	Normal Female	178.65	179.50	181.3	0.026NS	4.63NS	9.68NS
Average Serum Triglycerides (mg/dl)							
1	Obese Male	158.12	139.97	139.47	4.96**	8.00**	11.16**
2	Normal Male	141.31	135.96	124.36	6.42**	7.07**	6.46**
3	Obese Female	152.3	138.56	130.2	7.527**	5.07**	5.85**
4	Normal Female	122.13	120.54	119.2	1.047NS	7.53 NS	3.97 NS

* Significant at 5% level
** Significant at 1% level
NS Non significant

Table–(3) Effect of Aerobics on average low density lipoprotein (mg/dl), average high density lipoprotein (mg/dl) and average very low density lipoprotein (mg/dl) of normal and obese subjects

S. No.	Group	average low density lipoprotein (mg/dl)					
		Zero Month n=40	One month n=40	Two Month n=24	to-1	t1-2	to-2
1	Obese Male	151.69	135.35	125.28	8.88**	7.01**	9.98**
2	Normal Male	128.35	121.82	114.78	3.22**	6.56**	4.78**
3	Obese Female	143.90	129.74	120.92	9.007**	8.70**	13.61**
4	Normal Female	115.45	113.04	109.50	1.288NS	17.67*	11.55 NS
Average High Density Lipoprotein (mg/dl)							
1	Obese Male	44.72	47.37	50.05	8.43**	6.76**	8.14
2	Normal Male	38.69	40.79	45.14	3.90**	1.784NS	5.76**
3	Obese Female	38.8	42.18	45.94	12.00**	9.06**	12.66**
4	Normal Female	35.45	37.21	39.3	3.715**	5.91NS	5.32NS
Average Very Low Density Lipoprotein (mg/dl)							
1	Obese Male	31.62	27.99	27.89	1.497NS	5.85**	1.89 NS
2	Normal Male	28.26	27.19	24.87	0.935 NS	2.56 NS	2.36 NS
3	Obese Female	30.4	27.71	26.04	0.1163 NS	1.29 NS	0.65 NS
4	Normal Female	24.42	24.11	23.84	1.15 NS	1.928 NS	0.62 NS

* Significant at 5% level
* * Significant at 1% level
NS Non significant

Total Cholesterol: Base line data on average total serum cholesterol as presented in table 2 show that obese subjects of either sex or normal weight males were found to be at borderline risk. Brennan *et al.*[2] and Young and Sevenhuysen[9] in their respective studies observed the similar phenomenon of higher serum cholesterol of obese subjects in comparison of their normal weight counterparts. After two months of regular exercise, the subjects belonging to these three groups were able to reduce their cholesterol level but this reduction was significant in case of obese male only. Further obese subjects still had their serum cholesterol above desirable levels.

Lipoproteins: What is critical is not only the amount of cholesterol in the blood but how it is distributed in different lipoprotein fractions is also equally important.

Raised concentration of plasma LDL-C and a low concentration of HDL-C fractions associated with high blood presence are the important risk factors of coronary heart disease. With the gain in body weight, the situation worsens Schwartz *et al.* (1992) carried out a study to exercise the effect of exercise on young and older men and observed that lipoprotein levels were improved after exercise in both the groups.

Low Density Lipoprotein Cholesterol (LDL-C): Low density lipoprotein constitutes the major transport form of cholesterol in the blood, which carry cholesterol from the liver to the various parts of body. An excess of cholesterol gets deposited in the arteries hence LDL-C is commonly known as BAD CHOLESTEROL.

At the completion of study, reduction in LDL-C level was observed in all the groups of subjects. This reduction was found to be significant in all but group "NF" where the difference was observable only between the levels observed at first and second month. Contrary to the present findings Smoak *et al.*[7] after intense physical conditioning of their study subjects observed no change in lipid profile.

In contrast to normal weight subjects, obese were at risk at the baseline. However after two months of exercise, they also could attain the desirable level of LDL-C (130 mg/dl of blood) here, reduction of higher magnitude (17.4%) was noticed in case of obese males whereas in normal females, it was found to be the least (5.15%).

High Density Lipoprotein Cholesterol (HDL-C): The level of HDL-C in the study subjects ranged between 35.45 to 44.72, 37.21 to 47.37 and 39.30 to 50.05 mg/dl of blood at the start, after one and two months of study respectively (Table 3) Rontoyannis[6] suggested that diet combined with regular, exercise may increase HDL-C values. The group 'OF' could derive maximum benefit of Aerobic exercise as evident from highest percentage (18.4%) increase in their average HDL-C levels. However, lowest percentage (10.86%) increases, significant after one month was found to their normal weight counterparts. In a comparative study on exercise and non exercise groups Hinkleman and Neiman[4] observed an increase in HDL-C levels in non exercise groups and reduction was observed in case of exercise group, the findings are in contrast with the present results.

Very Low Density Lipoprotein Cholesterol (VLDL-C): Unlike the observations on average total cholesterol, LDL-C, HDL-C, serum triglycerides, a non significant difference was observed in the mean VLDL-C between all the groups at different period of study.

Overall, it can be stated that effect of Aerobics on mean VLDL-C levels could not be visualized in all four groups and its concentration (mg/dl) ranged between 33.56 to 32.4 and 32.22 to 31.60, 33.26 to 33.67 and 27.78 to 32.0 in 'OM', 'NM', 'OF' and 'NF' groups respectively (Table 3).

Serum Triglycerides (TG) The other major type of fat present in the blood is triglyceride. Recent reports suggest that elevated triglycerides also increase the incidence of cardiovascular disease.

Fig. 1: Effect of Aerobics on Lipid Profile of Obese Male Subjects at Different Periods of Study

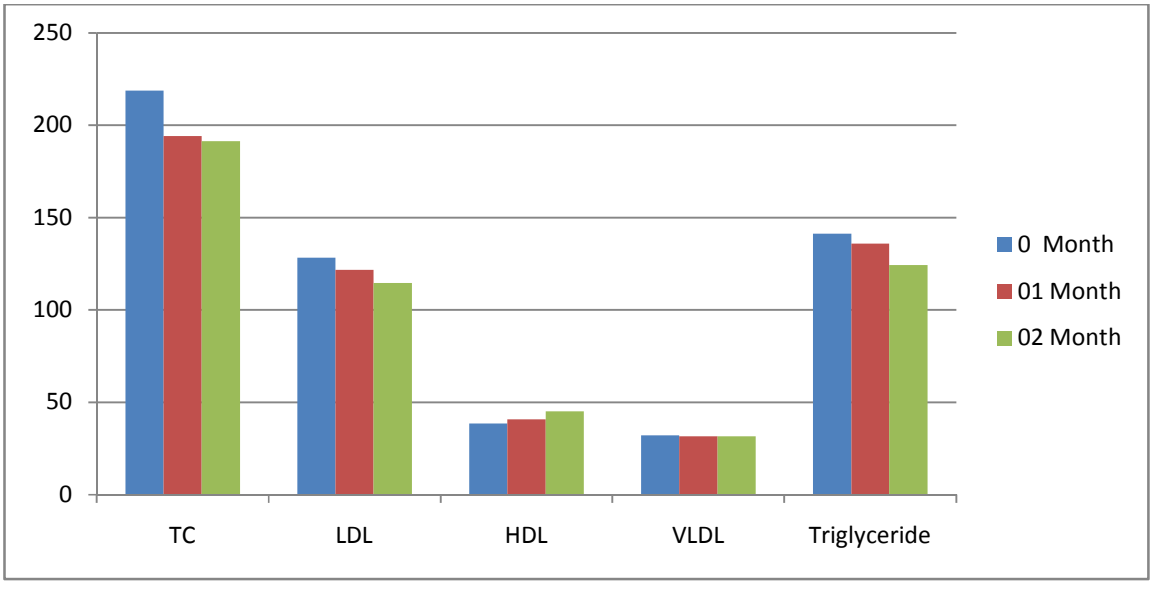


Fig. 2: Effect of Aerobics on Lipid Profile of Normal Male Subjects at Different Periods of Study

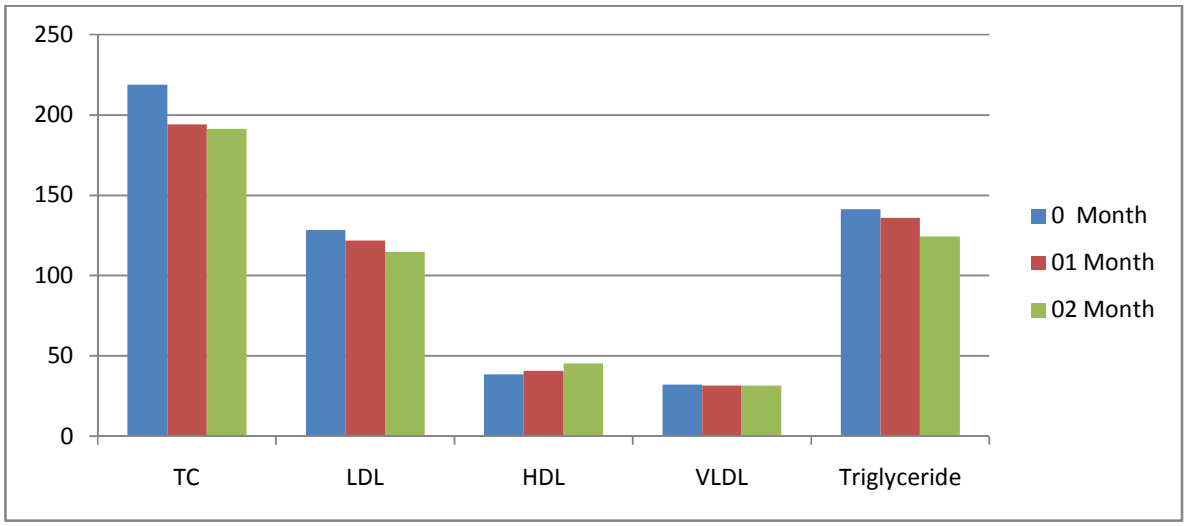


Fig. 3: Effect of Aerobics on Lipid Profile of Obese Female Subjects at Different Periods of Study

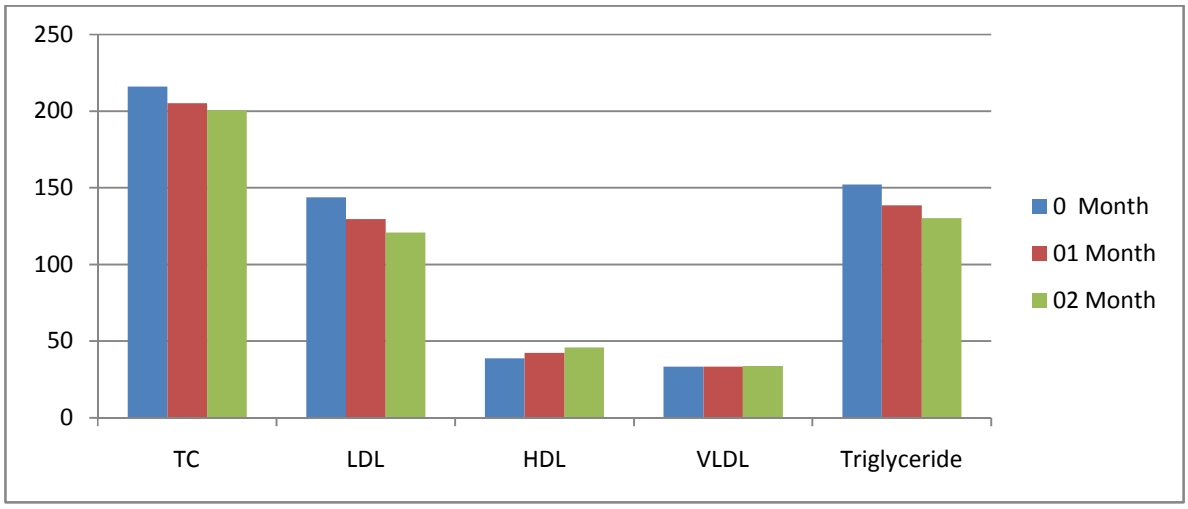
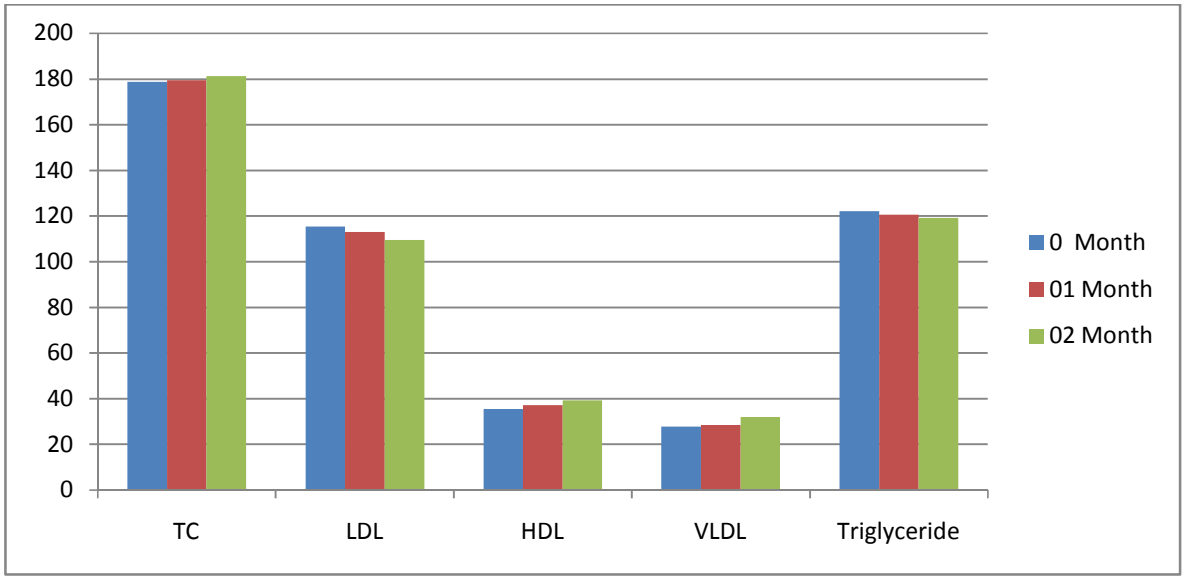


Fig. 4: Effect of Aerobics on Lipid Profile of Normal Female Subjects at Different Periods of Study



Observations presented in table 3 clearly show a significant impact of Aerobics on triglycerides levels of obese males, obese females and normal males. However, in case of group 'NF' a slight but non-significant reduction was observed. As can be seen from the initial values all the subjects had their mean triglycerides levels less than 250 mg/dl of blood which successively decline during the course of study. The findings of Finn *et al.*[3] were in tune with the results of the present study that exercise induces decrease in serum triglycerides.

CONCLUSION

It can be concluded that aerobics has a definite role in reduction of weight, & lipid levels which suggests that the inclusion of aerobic exercise in lifestyle practices will reduce the risk factors associated with Diabetes & Cardio vascular disease.

It can be concluded the aerobic exercise had a definite role in reduction of weight and lipid profile of the subjects.

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