International Journal of Physical Education

Research Article

Volume 5 | Issue 2 | October, 2012 | 176-179

Changes in the body composition of sedentary people under the influence of cardiac workout

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Received : *05.09.2012;* **Revised :** *25.10.2012;* **Accepted :** *28.10.2012*

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■ **ABSTRACT**

The purpose of the study was to investigate the comparative effect of morning cardiac and evening cardiac workout on body composition. Thirty male and female sedentary life style people of Gwalior in the age group of 25-35 years were randomly selected as subjects for the study. All the subjects were divided randomly into three groups: experimental group and a control group was having equal number of subjects. The group A participated in morning empty stomach cardiac workout and group B was trained with evening cardiac workout prepared by the investigator himself whereas control group did not participate in any workout for 8 weeks except their daily routine activity programme. The data were analyzed using the analysis of co-variance (ANCOVA) at 0.05 level of significance and showed significant change in body composition. Post hoc mean comparison showed experimental groups (morning and evening cardiac group) had significant difference with control group in body weight, fat percentage and lean body mass whereas in case of lean body mass, no. significant difference was found between morning cardiac and evening cardiac groups. The results of the study showed that morning cardiac workout was more effective and produced significant improvement.

■ **Key Words :** Body composition, Sedentary people

■ **How to cite this paper :** Kumar, Sanjeev and Tiwari, Harish (2012). Changes in the body composition of sedentary people under the influence of cardiac workout. *Internat. J. Phy. Edu.*, **5** (2) : 176-179.

The nature of our civilization has been changing slowly from active to more sedentary. While participation in regular physical activities in developed countries gradually increased during the '60s', '70s' and rarely '80s', it level off in the '90s'. In fact, current studies found that today 60 per cent of world adults are overweight and out of shape because of advance technology and wonderful labour saving devices. The human body was designed for a lot more physical activity than modern people need to survive. Nature and evolution have prepared us for a lifestyle very different from the one that most of us lead. When health is absent, wisdom cannot reveal itself, art cannot become manifest, strength fight, wealth becomes useless and intelligence cannot be applied .Fit citizens are a nations best assets and weak ones its liabilities (Triger, 2000). Lack of activity destroys the good condition of every human being while movement and methodological physical exercise save it and preserve it.

With the advent of various health problems due to faulty eating habits and obesity, fitness has become the mantra in the lives of many people. Today we live in a world where almost everyone is health conscious, so much so that the number of people who own fitness equipment at home has drastically shot up. Good fitness is key to reducing the risk of injury, enhancing performance, and ensuring longer life. A physically fit individual is one who has the ability to meet the demands of a specific physical task at an optimal level (McCarty, 1995).

Exercise physiologist Greg Landry (2000) author of "The metabolism system for weight loss and fitness, explains, "I agree that one burn a fuel mix that is a little higher in fat if one exercising on an empty stomach. However, I think the real question is, does that matter? I believe we have a pool of

calories stored in different forms in the body (fat, glycogen, etc.), so burned calories all come from the same pool. Thus, it really doesn't matter that the fuel mix has a little more fat in it at a given time."

The majority of research shows that as far as real world fat loss goes, it doesn't really matter what one burn. Rather, 24-hour calorie balance is what matters. Because if one burn glucose during exercise, tend to burn more fat the rest of the day. If one burn fat during exercise, burn more glucose during the day (Aceto, Chris, 1997).

Cardio-vascular exercise (which is covered in more detail below) is very effective at burning fat whilst working in the range 65 per cent to 75 per cent of maximum heart rate. Elliptical trainer is good for getting a high calorie burn as arms are exercised as well as legs and range of motion the elliptical supports gives a full body workout, although on the treadmill one will have to completely rely on legs to build momentum and this way the intensity of the workout is high. The heart rate goes higher and you burn more calories therefore, both the machines are excellent choices for weight loss exercise options as a cardiac workout. Treadmills focus on the lower body parts while elliptical trainers can give a whole body workout. Both machines enable to burn a lot of calories and aid weight loss. Even though morning aerobic exercise has been embraced by bodybuilders as a "tried and true" fat loss technique, there is definitely not a unanimous agreement about its effectiveness, especially in the scientific community. Most competitive bodybuilders are die-hard advocates of doing aerobic exercise first thing in the morning before eating their first meal. They believe it will cause them to mobilize more stored body fat and increase their metabolic rate all day long. In order to improve cardio respiratory endurance, control body weight and reduce the risk of premature chronic disease, an individual should perform 20 to 60 minutes of continuous or intermittent aerobic exercise at an intensity of between 50 per cent and 85 per cent of their maximal oxygen uptake (VO_2max), three to five days per week (Olson *et al.,* 1991; Pollock *et al* ., 1998).

Therefore, the purpose of this study was to examine the comparative effects of an eight-week morning cardiac and evening cardiac workout exercise programme on body composition of sedentary male and female.

■ METHODOLOGY

Thirty male and female sedentary life style people of Gwalior in the age group of 25-35 years were randomly selected as subjects for this study. All subjects have undergone the medical checkup before the start of the training programme. All the subjects were divided randomly into three group experimental groups and a control group and each group have equal number of subjects. The group A participated in morning elliptical trainer and treadmill cardiac workout and group B was trained with evening elliptical trainer and treadmill cardiac workout prepared by the investigator himself whereas control group did not participate in any workout for 8 weeks except their daily routine activity programme. Group A was trained empty stomach in the morning between 6.00-7.00 am whereas group B trained in evening between 6.00-7.00 pm. Duration of cardiac workout was 40 minutes including warm-up and cool-down for both the experimental groups. Cardiac workout was started with 50 per cent intensity of maximum heart rate (MHR) and finished after 8 weeks with 65 per cent intensity (MHR) and after 2 weeks of workout 5 per cent intensity was increased so on. Participants were instructed not to use any substances for reducing body weight and intake of low caloric food. A measurement of body composition were taken at the beginning and after the experimental period of eight weeks and skin fold caliper was used to take date from suprailic, subscupla, biceps, ticeps and calf muscle of all the participants. The experiment was conducted at LNUPE fitness centre, Gwalior.

■ OBSERVATIONS AND DISCUSSION

To find out the significant difference of two types of cardiac program on body composition, the analysis of co-variance (ANCOVA) f-ratio was employed at 0.05 level of significance. The result pertaining to the analysis of co-variance done for two experimental groups and control group of body weight performance are presented in Table 1.

Table 1 : Analysis of covariance for the two experimental and control group of body weight

Source of variance	d.f.	SS	MSS	F value	Remarks
Training	2	94.12	47.05	3.79	(P<0.05)
Error	26	322.66	12.41		

*Indicate significance of values at P=0.05.
Tabulated value of (2,26) is 3.37, SS= Sum square due to error, MSS= Mean sum of square, F= F-ratio value

From Table 1 it is evident that the adjusted F-ratio value is 3.79 which was found greater than tabulated F-ratio value (3.37), significant at 0.05 level. It indicates that mean score of body weight of subjects belonging to experimental groups and control group differed significantly. Thus, the null hypothesis (H_0) that the adjusted mean scores of body weight of subject belonging to experimental groups and control group differed significantly by considering pre-body weight as covariate so null hypothesis is rejected. As the F-ratio was found significant in the case of body weight, the significant difference (LSD) post-hoc test was applied to test the significant difference between paired means on body composition has been presented in Table 2.

Table 2 : Paired adjusted final means and differences between means among the experimental and control groups of body weight

Group means			Mean difference	Critical difference at 5% level
Morning cardiac group	Evening cardiac group	Control group		
54.93	58.65		3.72*	
54.93		63.61	8.68*	3.23
	58.65	63.61	4.96*	

* Indicate significance of values at P=0.05.

It is evident from Table 2 that mean differences of control and experimental groups were found to be significant whereas the mean difference of morning cardiac group and evening cardiac group was also found statistically significant at 0.05 level. It reveals from above table that morning cardiac group workout was more effective than the evening cardiac group workout.

The result pertaining to the analysis of co-variance done for two experimental groups and control group of fat percentage performance are presented in Table 3.

Table 3 : Analysis of covariance for the two experimental and control groups of fat percentage

Source of variance	d.f.	SS	MSS	F value	Remarks
Training	2	19.45	9.72	5.23	(P<0.05)
Error	26	48.36	1.86		

* Indicate significance of values at P=0.05. Tabulated value of (2,26) is 3.37
SS_e=Sum square due to error, MSS_e=Mean sum of square, F_e= F-ratio value

From Table 3 it is evident that the adjusted F-ratio value is 5.23 which was found greater than tabulated F-ratio value (3.37) significant at 0.05 level. It indicates that mean score of fat percentage of subjects belonging to experimental groups and control group differed significantly. Thus, the null hypothesis (H_0) that the adjusted mean scores of fat percentage of subject belonging to experimental groups and control group differed significantly by considering pre-fat percentage as covariate so null hypothesis is rejected. As the F-ratio was found significant in the case of fat percentage, the significant difference (LSD) post-hoc test was applied to test the significant difference between paired means on body composition has been presented in Table 4.

Table 4 : Paired adjusted final means and differences between means among the experimental groups and control group of fat percentage

Group means			Mean difference	Critical difference at 5 % level
Morning cardiac group	Evening cardiac group	Control group		
8.10	12.30		4.2*	
8.10		14.78	6.68*	1.25
	12.30	14.78	2.48*	

* Indicate significance of values at P= 0.05.

It is evident from Table 4 that mean differences of control group and experimental group were found to be significant whereas the mean difference of evening cardiac group and morning cardiac group was also found statistically significant at 0.05 levels. It reveals from above the table that morning cardiac group workout was more effective than the evening cardiac group workout.

The result pertaining to the analysis of co-variance done for two experimental groups and control group of lean body mass performance are presented in Table 5.

Table 5 : Analysis of covariance for the two experimental and control groups of lean body mass

Source of variance	d.f.	SS	MSS	F value	Remarks
Training	2	65.2	32.65	8.50	(P<0.05)
Error	26	99.84	3.84		

* Indicate significance of values at P=0.05. Tabulated value of (2,26) is 3.37
SS_e= Sum square due to error, MSS= Mean sum of square, F_e= F-ratio value

From Table 5 it is evident that the adjusted F-ratio value is 8.50 which was found greater than tabulated F-ratio value (3.37) significant at 0.05 level. It indicates that mean score of lean body mass of subjects belonging to experimental groups and control group differed significantly. Thus, the null hypothesis (H_0) that the adjusted mean scores of lean body mass of subjects belonging to experimental groups and control group differed significantly by considering pre-lean body mass as covariate so null hypothesis is rejected. As the F-ratio was found significant in the case of lean body mass, the significant difference (LSD) post-hoc test was applied to test the significant difference between paired means on body composition has been presented in Table 6.

Table 6 : Paired adjusted final means and differences between means among the experimental and control groups of lean body mass

Group means			Mean difference	Critical difference at 5% level
Morning cardiac group	Evening cardiac group	Control group		
53.78	54.93		1.15	
54.78		57.84	3.06*	1.80
	54.93	57.84	2.91*	

* Indicate significance of values at P=0.05.

It is evident from Table 6 that mean differences of control group and experimental groups were found to be significant whereas the mean difference of morning cardiac group and evening cardiac group was not found statistically significant at 0.05 level.

A major problem in last 40 years has been a steady increase in obesity both in adults as well as in children. The purpose of the study was to investigate the comparative effect

of morning elliptical trainer and treadmill cardiac and evening elliptical trainer and treadmill cardiac workout on body composition of sedentary male and female.

The finding of the study showed that there was a significant difference in body composition between morning cardiac and evening cardiac workout groups at 0.05 level of significance. The group A participated in morning elliptical trainer and treadmill cardiac workout and group B was trained with evening elliptical trainer and treadmill cardiac workout. In case of body weight and fat percentage, morning cardiac group and evening cardiac group had significant difference whereas in case of lean body mass there was no significant difference between experimental groups although control group had significant difference in body composition with experimental groups. Early morning cardiac workout helped to reduce the body weight and fat percentage at fastest rate than evening cardiac workout because it mobilized more fat because of the unavailability of glycogen and less glucose available and less insulin is present in the morning; therefore, more body fat was burned when aerobic exercise was done in the morning. If eat immediately before, a workout, have to burn off what just ate first before tapping into stored body fat. Morning cardiac workout elevated the metabolism for a period of time after the workout is over whereas evening cardiac workout burn calories during the session but failed to take advantage of the "after burn" effect because metabolic rate drops dramatically as soon as go to sleep. Since a large number of muscle groups are involved in cardiac workout, the programme involved both muscle use for anaerobic training and cardio-vascular training (Fig. 1).

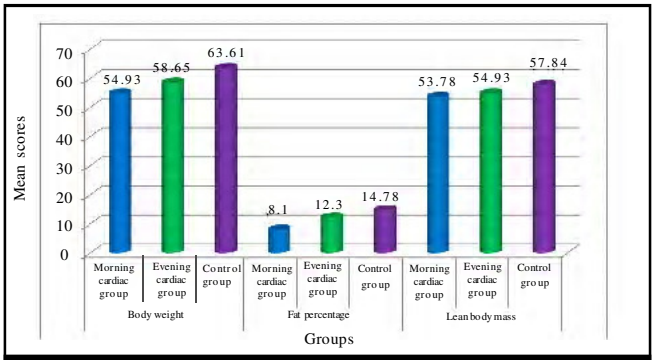

Fig. 1: Paired adjusted means of the two experimental and control groups of body weight, fat percentage and lean body mass

Finding of this study are in consonance with the study (Wilcox, Harford and wedel medicine and science in sports and exercise,1985), showed that a kilogram of fat is burned sooner when exercise is done in the fasted state in the morning than done later in the day. The finding of this study is also in agreement with the study conducted by (Landry,2000) explains that burn a fuel mix that is a little higher in fat if exercising on an empty stomach. Regular physical activity leads to significant changes in terms of increased health related fitness and can reduce risk factors for developing a range of disabling medical conditions which occur in inactive people (Carol *et al.,* 1992). In conclusion, general, exercise is beneficial for health and physical fitness, while a sedentary lifestyle has a negative effect on a person's well-being and morning aerobic exercise has enough indisputable benefits to motivate most people to control their body composition and to set their alarms early.

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