



## EFFECT OF EXERCISE ON OBESITY IN HEALTHY ADULTS

## Physiology

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## ABSTRACT

**INTRODUCTION-** In lights of current obesity epidemic, treatment models are needed that can provide weight loss. We examined the effect of supervised exercise on body weight and composition in previously obese men and women.

**OBJECTIVE-** We hypothesized that a 3 months program of exercise would provide weight loss as compared to control.

**METHODS:** A 60 obese adult men and women (mean body mass index [ $\pm$ SD],  $30.80 \pm 4.19$  kg/cm<sup>2</sup>), mean weight  $74.94 \pm 10.84$  with a mean waist circumference of  $90.24 \pm 8.45$  cm) were selected to either exercise intervention or control condition for 3 months. 30 participants completed exercise and rest are controls. A control group of participants was asked not to engage in any structured exercise during the study.

**RESULTS:** After 3 months participants in the exercise group had significance decrease in weight ( $5.09 \pm 4.73$  kg), waist circumference ( $7.87 \pm 0.83$  cm), body mass index ( $5.64 \pm 0.59$  kg/cm<sup>2</sup>), total body fat loss in women ( $3.92 \pm 0.5\%$ ) and in men ( $4.33 \pm 1.33$ ) as compared to control.

**CONCLUSIONS:** These findings suggest that, (Provided there are no changes in diet) exercise can bring about weight loss.

## KEYWORDS

Obesity, Exercise, Weight loss

## INTRODUCTION

Reduction in the prevalence of obesity was one of the major aims of Healthy People in 2000, although it is now apparent that this goal was not achieved.

In 1980, data from the second National Health and Nutrition Examination Survey showed that 47% of adults were obese and this figure increased dramatically in data from the third National Health and Nutrition Examination Survey (1999) to 61% of adults.<sup>1,2</sup> Recently, the Surgeon General indicated that obesity ranks next to cigarette smoking as a cause of preventable disease and death, with a health care cost of approximately \$117 billion per year.<sup>3</sup> Obesity contributes to heart disease, hypertension, diabetes mellitus, and some cancers.<sup>4,5,6</sup> Treatment of obesity is notoriously difficult and most individuals who lose weight eventually regain it.<sup>8</sup>

Prevention of obesity relies on maintaining energy balance through equilibrium of energy intake and energy expenditure. In an environment where energy-dense, palatable foods are abundant, it is difficult for many individuals to maintain energy balance through diet. Regular exercise may be useful for increasing energy expenditure and maintaining energy balance, thereby providing weight loss. Thus, the purpose of this investigation is to determine the effect of supervised exercise facilitate weight loss in obese adults.

## MATERIAL AND METHODS

A total of 30 obese individuals were selected for an exercise intervention for 3 months. Participants were recruited from a fitness point located in Bodakdev, Ahmedabad. All participants completed exercise and exercise was supervised by a trainer. A total of 30 obese individuals were selected for a control condition. Participants were recruited from a nursing college staff room located in Ahmedabad. A control group of participants were also asked not to engage in any structured exercise (Keeping their routine as usual) during the study, which lasted 3 months. All the participants gave informed consent before participating in any aspect of the intervention.

## &gt;Inclusion criteria-

Participants were aged 17 to 55 years and were obese.

## &gt;Exclusion criteria-

Participants who had a history of chronic disease (ie, diabetes mellitus, heart disease, etc.), elevated blood pressure ( $>140/90$  mm Hg), elevated lipid levels (cholesterol  $>260$  mg/dL [ $>6.72$  mmol/L] and triglycerides  $>500$  mg/dL [ $>5.65$  mmol/L]), or elevated fasting glucose levels ( $>140$  mg/dL [ $>7.8$  mmol/L]) were excluded. In addition, participants were excluded if they took medications that

would affect physical performance (ie,  $\beta$ -adrenergic blocking agents) or if they lacked the ability to participate in exercise.

## INTERVENTION

## Exercise Intervention

Participants were randomly assigned to complete 5 exercise sessions each week (300 minutes/week). Exercise consisted primarily of walking on motor-driven treadmills; however, alternate activities such as zumba, aerobics, yoga, cycling, weight training and walking on stationary elliptical trainers were also allowed. Exercise training consisted of a warm-up phase (10 minutes), an aerobic phase (20 minutes), a resistance-training phase (15 minutes), and a cool down phase (15 minutes). The resistance-training portion of the program consisted of 2 sets of 12 repetitions of the following exercises: leg extension, leg curl, heel raise, and step-up. Cuff weights and weighted vests were used to provide resistance. A 1–1.5-minute rest interval separated each exercise.

## Control Group

They were instructed to maintain their usual physical activity and dietary intake patterns throughout the study.

## ASSESSMENTS

## Body Weight and Composition

Body weight was measured at baseline and at 3 months using a digital scale accurate to  $\pm 0.1$  kg. Waist circumference measured at just below the umbilicus using a standard measuring tape, height was measured on standard height scale, BMI calculated in kg/cm<sup>2</sup>, and body fat % was calculated by using the formula by Jackson, A.S., & Pollock, Generalized equation for predicting body density.

## RESULTS

## Table:1 Baseline characteristics of 60 participants who completed the study\*

Characteristic	Participants
Weight (kgs)	$74.94 \pm 10.84$
Waist circumference (cms)	$90.24 \pm 8.45$
BMI (Kg/Cm <sup>2</sup> )	$30.80 \pm 4.19$
Body fat % (women)	$33.99 \pm 7.63$
Body fat % (men)	$20.10 \pm 4.60$

\* Data are given in mean  $\pm$  SD

Table:1 describes the baseline characteristics of all participants were with mean body mass index of [ $\pm$ SD],  $30.8 \pm 4.19$  kg/cm<sup>2</sup> (calculated as weight in kilograms divided by the square of height in cms), mean waist circumference was  $90.24 \pm 8.45$  cms, mean weight was  $74.94 \pm 10.84$  kgs, mean body fat in women was  $33.99 \pm 7.63\%$  and in men was  $20.10 \pm 4.60\%$ .

**Table-2 body weight, body composition after 3 months in both exercise and control group\***

Characteristic	Exercise Group	Control Group
Weight (kgs)	69.85 ± 6.11	76.37 ± 9.11
Waist circumference (cms)	82.37 ± 7.62	91.27 ± 8.58
BMI (Kg/Cm <sup>2</sup> )	25.16 ± 3.60	32.44 ± 4.10
Body fat % (women)	30.07 ± 7.13	36.89 ± 7.73
Body fat % (men)	15.77 ± 5.93	21.40 ± 4.80

\* Data are given in mean ± SD

Table:1 and Table:2 describe that exercise group had significance decrease in weight(5.09±4.73kg),waist circumference (7.87±0.83cm), body mass index(5.64±0.59kg/cm<sup>2</sup>),total body fat loss in women (3.92±0.5%) and in men(4.33±1.33%) as compared to control group who had significance increase in weight(1.43±1.73 kg),waist circumference (1.03±0.13cm), body mass index (1.64±0.5kg/cm<sup>2</sup>), total body fat gain in women(2.9±0.1%) and in men(1.3±0.2%).

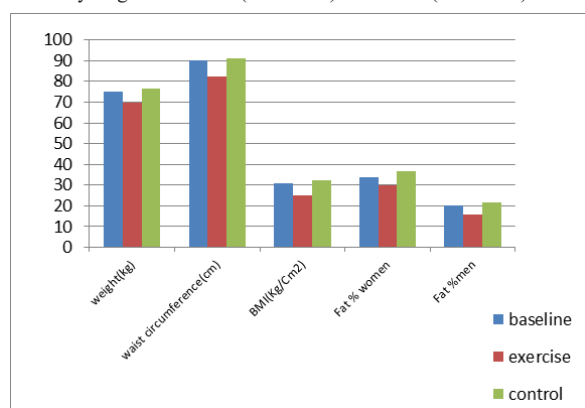


Figure-1 showing there is significant decrease in weight,waist circumference, BMI and body fat% in exercise group as compared to the control group.

## DISCUSSION-

Exercise had a significant effect on body weight over 3 months in obese adults, independent of any dietary changes.Exercise without changes in diet produced significant reductions in body weight, total body fat.We believe the most important finding in the present study was the clear relationship observed between the exercise and the amount of weight change in obese individuals(Figure 1).This occurred even in the absence of reduced caloric intake.The fact that the controls gained weight while exercise group lost weight indicates that the controls were,on average,in sustained positive energy balance and that a relatively small amount of exercise can reverse this condition,resulting in a sustained negative energy balance.

During the 3-months study, group who exercised lost an average of 5.09kg of body weight that corresponded to approximately 6% of baseline weight and a decrease of 5.6 BMI units.Other researchers have shown that as little as a 5% reduction in weight is associated with reduction in coronary heart disease risk factors such as hypertension,<sup>11</sup> lipids,<sup>12-13</sup> and plasma glucose.<sup>14</sup>

Data from this study yielded information regarding the effects of exercise on the primary prevention of obesity in adults.Data from the National Weight Control Registry,<sup>20</sup> Jakicic et al,<sup>21</sup> and Schoeller et al<sup>22</sup> indicate that prevention of weight regain is associated with 280 to 350minutes of moderate intensity exercise per week compared with 300minutes per week used in the present study. In adults, 300minutes of exercise per week not only prevented weight gain but also provided significant weight loss. Thus, 300minutes per week of moderate-intensity exercise may be a guideline for the amount of exercise needed for the reduction of weight in adults.At this time, we do not know if the prevention of the weight loss shown in this sample will persist or if these participants will follow the usual pattern of weight gain over time.

## CONCLUSION-

The major finding of the present study was that there was a clear dose-response relationship observed between amount of weekly exercise

and amount of weight change.This is not surprising, since this study and other carefully conducted investigations<sup>16,17,18</sup> show the issue is simply one of energy balance for control of weight.This relationship, coupled with the finding that the controls gained weight while a fairly modest amount of exercise led to weight loss, provides strong support for the Mayer hypothesis that a minimal amount of physical activity is necessary for appropriate weight control.<sup>16,17</sup>

Our study shown that 3 months of supervised, moderate-intensity exercise (60min/d,5d/wk) had major effects on weight management in obese adults.

We have few, if any, proven strategies to combat the obesity epidemic. These results establish exercise as an effective weight management tool for adults.

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