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# Effect of Circuit Training Programme on BMI and body fat on Pre-Obese Adolescents

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**Abstract**
The present study was conducted to assess the effect of Circuit Training Programme on Physiological parameters on Pre-Obese Adolescents. The objective of the study was to found out the effect of 30 minutes Circuit Training Programme on BMI, Body-Fat, of sedentary pre-obese adolescent for a total duration of 21 days. For the purpose of the study, thirty (n=30) subjects were selected. The age group of the subjects ranged from 12 years to 18 years. The subject selected were the students from Kendriya Vidyalaya, Shalimar Bagh New Delhi. The Statistical Technique employed for analysing the data were Mean, Standard Deviation and 't' test. The level of significance was set at 0.05 for interpreting the results. The result of the study indicates a significant difference in BMI, Body-Fat, between Experimental and Control group. Further, Experimental group had significantly lower average performance mean score as a result of 21 days of Circuit Training than the control group subjects who were not engaged in any training programme.

**Keywords:** Circuit Training Programme, BMI, body-fat

## Introduction
Obesity is a worldwide concern. In 2016, more than 1.9 billion adults were classified as overweight, 13% were obese and 41 million children aged under 5 were overweight or obese. Childhood obesity is a critical public health threat as the prevalence of obesity amongst youth continues to increase worldwide, and there is the risk of developing obesity-related diseases at an increasingly younger age. Prevention and treatment programmes suitable for youth have been developed for which physical activity is an integral component (Ogden, *et al*., 2006) [2]. Wagner, *et al*. (2005) [3] recent study found that gradually changes have occurred in the health status of adolescence due to wrong lifestyle and food habits. Moreover Matton *et al*. (2007) [4] recent study found that physical fitness and involving in physical activity have declined worldwide in the last decades among adolescence therefore obesity proportion has been increasing worldwide

Body mass index (BMI) is used to assess the body fat proportion and lean mass. Increasing the BMI reduces the volume of lungs in obese adolescence thus distribution of body fat should be modified because high BMI lead to negative impact on health related parameters. Endurance and resistance training decrease the fat mass and increase total lean mass (Moro, *et al*. (2005) [5]: Nindl *et al*. (2000) [6]. Kwon *et al*. (2010) [7] studies proved that resistance training helps to build fat-free mass as well as promoting positive changes in body fat. High intensity Circuit Training (HICT) can be a fast and efficient way to lose excess body weight and body fat. Previous studies found that significant decreases in body weight, body mass index, abdominal fat.

## Problem Statement
The purpose of the present investigation was to find the effect of Circuit Training Programme on BMI, Body-Fat on Pre-Obese Boys Adolescents with an objective to find out the effect of 30 minutes of Circuit Training Programme on BMI, Body-Fat.

## Methodology
The study was formulated as an experimental design of 21 days of training to find out the effect of Circuit Training Programme on BMI, Body-Fat. Thirty (30) male subjects who were

selected for the study was randomly assigned to two different groups namely Circuit Training as Experimental group & Control group (Not exposed to any training). Circuit Training group consisted of 15 subjects, and Control group consisted of 15 subjects. The age group of the subjects ranged from 12 years to 18 years. The data was collected prior to the start of training session (pre –training data), and after completion of 21 days of circuit training (post- training data) on BMI, Body-Fat variable. For measuring the BMI, Body-Fat of the subjects. The research scholar used for the BMI, BODY FAT% TEST Omron HBF-306 body fat monitor was used.

Circuit training group was given 5 days a week for 3 weeks and 4th week having 6 days. The control group was not exposed to any training programme. Circuit Training unlisted eight exercise grouped used 8 different states which constituted one circuit. The eight states included following exercise:

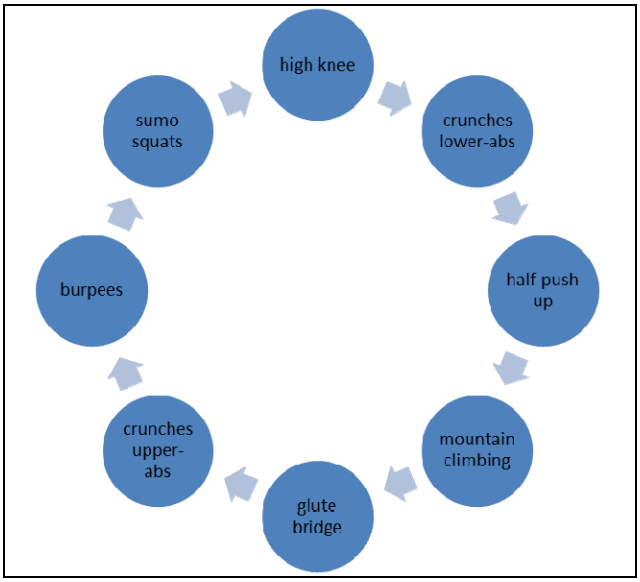


**Fig 1:** Circuit training programme

**Findings**

To find out the effect of circuit training on BMI, BODY FAT% in pre –obese adolescents the mean, standard deviation and the 't' test were calculated which are presented in the table 1.

**Table 1:** Descriptive Statistics &Paired 't' Test of Physiological Variables of Experimental and Control Group

| Variables | Groups | Mean | Std. Deviation | Std. Error Mean | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|
| BMI | Pre-Exp | 26.93 | 1.10 | 0.284 | 5.214 | 14 | 0.001 |
| | Post- Exp | 25.61 | 1.01 | 0.262 | | | |
| BMI | Pre- Control | 26.98 | 1.135 | 0.293 | 5.574 | 14 | 0.000 |
| | Post- Control | 27.34 | 1.154 | 0.298 | | | |

From table no.1 the results indicate that there was significant difference in body mass index (BMI) between pre and post data of experimental group t (14) = 5.214, P = 0.001, which is less than 0.05. That is the average score of pre data experimental group (M=26.93, SD=1.10) was statistically different from that of post data experimental group (M=25.61, SD=1.01). Thus, it could be concluded that there was a significant difference in body mass index (BMI) between pre and post data of experimental group. However, there was a decrease in the mean score of BMI after 21 days of participation in circuit training programme.

From table no.1 the results indicate that there was significant difference in body mass index (BMI) between pre and post data of control group t (14) = 5.574, P = 0.000, which is less than 0.05. That is the average score of pre data of control group (M=26.98, SD=1.135) was statistically different from that of post data of control group (M=27.34, SD=1.154). Thus, it could be concluded that there was a significant difference in body mass index (BMI) between pre and post data of control group.

**Table 2:** Descriptive Statistics & Independent 't' Test of Physiological Variables of Experimental and Control Group

| Variables | Groups | Mean | Std. Deviation | Std. Error Mean | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|
| BMI | Pre-Exp | 26.93 | 1.102 | 0.284 | 0.133 | 28 | 0.895 |
| | Pre- Control | 26.98 | 1.135 | 0.293 | | | |
| BMI | Post- Exp | 25.61 | 1.018 | 0.262 | 4.367 | 28 | 0.000 |
| | Post- Control | 27.34 | 1.150 | 0.296 | | | |

From table no.1the results indicate that there was no significant difference in BMI between pre data of experimental group and pre data of control group t (14) = 0.133, P = 0.895, which is greater than 0.05. That is the average score of pre data of experimental group (M=26.93, SD=1.102) was not statistically different from that of pre data of control group (M=26.98, SD=1.135). Thus, it could be concluded that there was a no significant difference in BMI

between pre data of experimental group and pre data of control group. Therefore, this indicates that both the groups were homogenous.

From table no.1 the results indicate that there was a significant difference in BMI between post data of experimental group and post data of control group t (14) = 4.367, P = 0.000, which is greater than 0.05. That is the average score of post data of experimental group (M=25.61, SD=1.018) was statistically different from that of post data of control group (M=27.34, SD=1.150). Thus, it could be concluded that there was a no significant difference in BMI between post data of experimental group and post data of control group.

The Mean scores from of pre-pre and post-post training BMI of Experimental and Control groups has been represented graphically in figure 1.

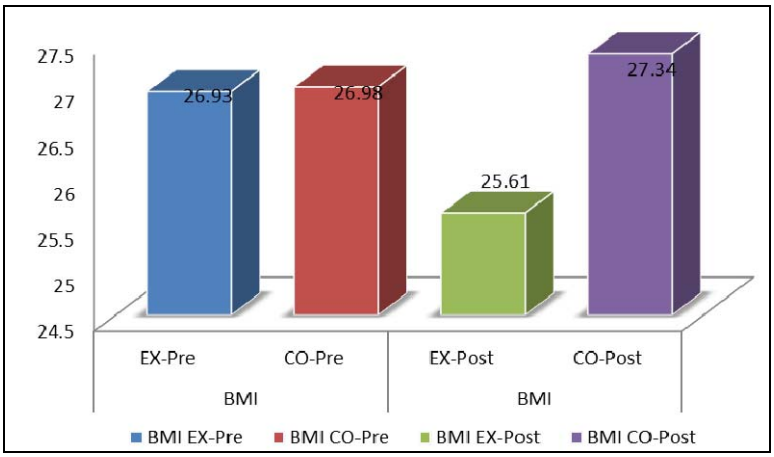


**Fig 2:** Graphical Representation of Mean Score from Table 1 and 2

**Table 3:** Descriptive Statistics & Paired 't' Test of Physiological Variables of Experimental and Control Group:

| Variables | Groups | Mean | Std. Deviation | Std. Error Mean | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|
| Body Fat | Pre-Exp | 26.81 | 3.31 | 0.856 | 8.329 | 14 | 0.001 |
| | Post- Exp | 24.80 | 3.50 | 0.904 | | | |
| Body Fat | Pre- Control | 25.42 | 2.634 | 0.680 | 4.180 | 14 | .001 |
| | Post- Control | 27.32 | 2.992 | 0.772 | | | |

From table no.3, the results indicate that there was significant difference in body fat% between pre and post data of experimental group t (14) = 8.329, P = 0.001, which is less than 0.05. That is the average score of pre data of experimental group (M=26.81, SD=3.31) was statistically different from that of post data of experimental group (M=24.80, SD=3.50). Thus, it could be concluded that there was a significant difference in body fat % between pre and post data of experimental group. However, there was a decrease in the mean score of body fat % after 21 days of participation in circuit training programme.

From table no. 3, the results indicate that there was significant difference in body fat % between pre and post data of control group t (14) = 4.180, P = 0.001, which is less than 0.05. That is the average score of pre data of control group (M=25.42, SD=2.634) was statistically different from that of post data of control group (M=27.32, SD=2.992). Thus, it could be concluded that there was a significant difference in body fat % between pre and post data of control group. However, there was an increase in the mean score of body fat% after 21 days of participation in circuit training programme.

**Table 4:** Descriptive Statistics & Independent 't' Test of Physiological Variables of Experimental and Control Group

| Variables | Groups | Mean | Std. Deviation | Std. Error Mean | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|
| Body Fat | Pre-Exp | 26.81 | 3.318 | 0.856 | 1.267 | 28 | 0.215 |
| | Pre- Control | 25.42 | 2.634 | 0.680 | | | |
| Body Fat | Post- Exp | 24.84 | 3.531 | 0.911 | 2.075 | 28 | 0.047 |
| | Post- Control | 27.32 | 2.99 | 0.772 | | | |

From table no.4 the results indicate that there was no significant difference in Body Fat Percentage between pre data of experimental group and pre data of control group t (14) = 1.840, P = 0.087, which is greater than 0.05. That is the average score of pre data of experimental group (M=26.81, SD=3.31) was not statistically different from that of pre data of control group (M=25.42, SD=2.63). Thus, it could be concluded that there was a no significant difference in Body Fat Percentage between pre data of experimental group and pre data of control group. Therefore, this indicates that both the groups were homogenous.

From table no.4 the results indicate that there was no significant difference in Body Fat Percentage between post data of experimental group and post data of control group t (14) = 2.075, P = 0.047, which is greater than 0.05. That is the average score of post data of experimental group (M=24.84, SD=3.53) was not statistically different from that of post data of control group (M=27.32, SD=2.99). Thus, it could be concluded that there was a no significant difference in Body Fat Percentage between post data of experimental group and post data of control group.

The Mean scores from of pre-pre and post-post training Body Fat % of Experimental and Control groups has been represented graphically in figure 2.

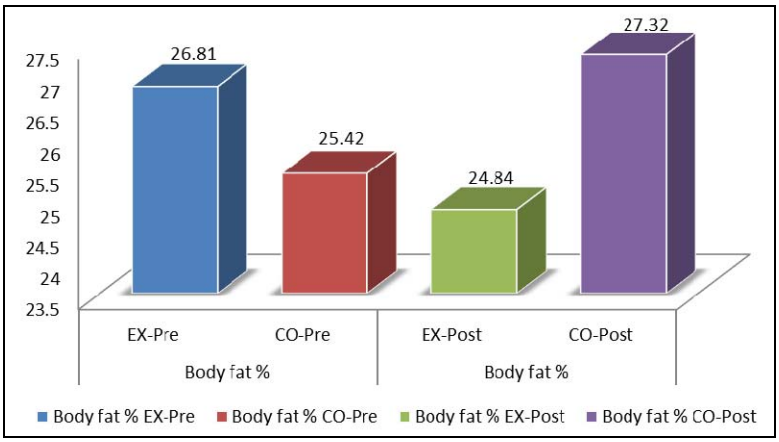


**Fig 3:** Graphical Representation of Mean Score from Table 3 and 4.

Based on our inspection of the above figure, it is clear that the circuit training group had significantly lower average performance mean score as a result of 21 days circuit training than the control group.

**Discussion of Findings**

Analysis of the data revealed a significant difference in the 't' value between the circuit training group and control group in physiological variable of BMI, Body-Fat. Further, these scores indicates that circuit training group had significantly decrease average performance score as a result of 21 days of circuit training programme than the control group subjects who were not engaged in any training programme. So the result shows that the circuit training has a positive influence on BMI, Body-Fat. Further, if we look at the result of the present study it is clearly visible that the circuit training group scores decrease in BMI, Body-Fat after engaging in a 21 days training programme in comparison to their pre-recorded data. Exercise showed positive effects on BMI, Body-Fat.

**Conclusions**

The result obtained after the implementation of circuit training on the variable of BMI, Body-Fat of experimental group, following conclusion are drawn:

1. The circuit training group had significantly decrease average performance mean score as a result of 21 days of circuit training than the control group subjects who were not engaged in any training programme.
2. There were significant differences in physiological variable of BMI, Body-Fat, between circuit training group and control group. This further indicates that the average performance of circuit training group on the physiological variable of BMI, Body-Fat, was significantly decrease from the control group.

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