

# A retrospective study to compare functional strength in high intensity circuit training group and low intensity interval training group among reproductive female

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## Abstract-

**Background:** Over the previous few decades, obesity has become more prevalent. WHO states that this global public health issue is being caused by the linear rise in obesity. A higher BMI results with a decreased overall fitness.

**Objective:** To determine the effectiveness of high-intensity circuit training versus low-intensity interval training on functional strength in overweight and obese reproductive females.

**Methodology:** A retrospective comparative Analytical cross sectional study in which 130 overweight and obese females with reproductive age (15- 49) were selected who were engaged in exercise program in past 2-6 months, Females having uncontrolled diabetes, thyroid disease, arthritis, cardiac diseases, asthma, hypertension, and recent trauma, females who were pregnant or using any weight loss products were not included in the study and divided into Group A and B. Group A who were doing High intensity circuit training and Group B who were doing low intensity interval training. Main outcomes were Functional strength which was measured from both groups. Data was analyzed through statistical package for social sciences (SPSS) software 20 version with 95% confidence level

**Results:** There were significant differences in Pushups (20.2-3.66), leg levers (20.35-4.55), burpees (17.06-4.15), Leg squats (left leg 22.35-4.61) (right leg 22.95-5.03) and skipping (29.52-6.47) between Group A and B (p value <.001).

**Conclusion:** This study concludes that high intensity circuit training in Overweight and obese females improved functional strength.

## Index Terms:

High Intensity circuit training, low intensity interval training, Body Composition, Body mass index, Circuit based exercise, Female, Obesity, and Overweight

## I. INTRODUCTION

Overweight and obesity are terms used to describe the unneeded buildup of body fat, and they both raise the chance of developing a number of co-morbid disorders<sup>1</sup>. Obesity has been more common among humans over the past few decades, and it is now regarded as a pandemic. The Growing rates of overweight and obesity, particularly among young adults, are become a challenge for healthcare and global health organizations suppliers in various nations. the people who were obese as children and most adolescents still have obesity when they are adults<sup>2</sup>

Sedentary lifestyles were the primary causes of overweight and obesity in the entire population, Fast food consumption, eating out, and the availability of calorie-dense food at low prices have all been on the rise in recent years<sup>3</sup>. Another study contends that various groups suffer from obesity as a result of a variety of behavioral, social, and societal reasons and that it is treatable with the use of societal incentives<sup>4</sup>. Obesity is brought on by a number of additional factors, including the frequency and length of meals, the time between meals, the person who made the meal, and the caliber of the ingredients<sup>5</sup>

The major risk factor for initiating various non-communicable diseases is obesity<sup>6</sup>. Many non-transmitted diseases more common overweight and obese population is such as high cholesterol, cardiovascular diseases and metabolic syndrome and it is a severe health problem for Indian population<sup>7</sup>. Obese young individuals are more likely to develop influenza infection, respiratory virus infection, and associated complications. Obese young adults are more likely than healthy young adults to die from the influenza pandemic<sup>8</sup>. Females who are obese and overweight when they are of childbearing age are much more likely than those who weigh a normal weight to start their pregnancy to develop neural tube abnormalities<sup>9</sup>. According to certain research, obese females who were childbearing age also had endocrine system dysfunction<sup>10</sup>.

Regular exercise has a variety of positive benefits on the risk factor for cardiovascular illnesses. Unknown is the exact method by which regular exercise improves the body's ability to use

insulin, lowers blood pressure, raises HDL cholesterol levels, strengthens the heart's muscles, reduces stress, and aids in body weight maintenance. Whatever the mechanism, regular exercise is advised for everyone as it lowers the risk of cardiovascular diseases<sup>11</sup>. The majority of the week should be dedicated to moderate-intensity physical exercise, according to recommendations<sup>12</sup> for improving health in overweight and obese people. Although there are numerous advantages to regular physical activity, many women choose not to participate in such programmes for a variety of reasons, including family responsibilities, a lack of company, poor health, and inability to access a gym, fees, and safety concerns. Walking is the greatest exercise for these circumstances because it is low-impact, affordable, and readily available to everyone<sup>13</sup>. Exercises are performed in short-to-long bursts of high intensity during high-

## II. METHODOLOGY:

A retrospective comparative Analytical cross sectional study was conducted. Data of 130 females was collected from ladies clubs in Gujranwala cantt Punjab Pakistan. Females of reproductive age (15-49)<sup>17</sup> with BMI >24.9 kg/m<sup>2</sup> were selected by using Judgmental sampling technique. Females having uncontrolled diabetes, thyroid disease, arthritis, cardiac diseases, asthma, hypertension, and recent trauma were not included in the study. Females who were pregnant was not included in the study. Females who were using weight loss products was not included

## DATA COLLECTION PROCEDURE AND TOOL:

In this trial, conducted in a single-center, females between the ages 14 – 49 years with a BMI >25 kg/m<sup>2</sup>, who were engaged in exercise program in the last six months, who were not using weight loss products, who were not having uncontrolled diabetes, thyroid disease, arthritis, cardiac diseases, asthma, hypertension, recent trauma and who were not pregnant will be selected. The design of the study was explained to the participants beforehand. Participants were selected and divided into groups A and B, 65 each group. Group A was those who were performing high-intensity circuit training and group B was those who were engaged in low-intensity interval training. The outcome measures were functional strength and which was measured from both groups.

## FUNCTIONAL STRENGTH TEST:

To check the functional strength, participants were instructed to perform leg lever, modified push-up, 45° one-legged squats, and

## III. RESULTS:

Total of 130 participants were included in this study, with 65 in each group i.e HICT and LIIT, Demographics of study of participants were mentioned in table:1.

Table:2

### Comparison between Variables Using t-test

intensity circuit training. There is a brief rest break in between each exercise session. By combining various work-to-rest ratios, high-intensity interval training can offer a wide range of exercise programmes<sup>14</sup>. It is a combination of resistance training and aerobic exercise training. One exercise is performed at one station for a specific period and then move to the next station where some other exercise is performed. One circuit is completed when individuals performed their exercises on all stations<sup>15</sup> this study will allow us to compare the effectiveness of high-intensity and low-intensity exercise in enhancing functional strength and weight efficacy in obese and overweight females. Our findings will assist obese and overweight ladies live better lives because obesity is on the rise in contemporary society.

burpees as many times as they can in 1 minute. Participants were instructed to perform a maximum number of cordless skipping in 30 seconds. All functional strength tests were separated by 3 minutes' recovery period<sup>16</sup>. To check the body strength these tests are highly valid and reliable in healthy young adults<sup>17</sup>. These tests were performed by both groups before starting the training program and again after the completion of an 8- week training program.

This study was approved by institutional review board of university of Lahore. Oral and written informed consent was taken from all selected females. Before data collection they were informed that their information kept confidential and anonymous throughout the study and they would be free to withdraw at any time during the study. All participants would be volunteer and their identity would not be revealed in results during publication. Data was analyzed through statistical package for social sciences (SPSS) software 20 version. Data was assessed at baseline for outcomes measures to check normality by using Shapiro Wilk test. For descriptive analysis, means and standard deviation was collected for numerical normal data whereas for data that is not normal median and interquartile range was collected and for categorical data frequencies and percentage was collected. For inferential statistics, Comparison between variables using t test was applied for significant value < 0.05 was considered as significance value. All results are calculated at 95% confidence level.

Table: 1

### Descriptive analysis of Variables

Variables	Intervention	
	High intensity circuit training, n=65	Low intensity interval training, n=65
	Mean±S.D	
Age of participant in years	29.89±8.86	27.92±8.10
BMI of participant (Kg/m <sup>2</sup> )	28.50±3.33	27.94±2.01
Waist to hip ratio	0.83±0.17	0.84±0.21

Variables	Intervention		t-test for Equality of Means		
	High intensity circuit	Low intensity interval	t	P-value	95%
					Upper and Lower
Number of push-ups per one	20.2±6.92	3.66±2.78	17.870	1.340	(14.69)-(18.37)
Number of leg-levers per one minute	20.35±5.59	4.55±3.09	19.905	5.230	14.22-17.37
Number of burpees per one	17.06±5.95	4.15±3.19	15.395	6.490	11.24-14.56
Number of 45 one legged(left) squats per minute	22.35±6.33	4.61±3.77	19.410	6.480	15.92-19.54
Number of 45 one legged(right)	22.95±6.47	5.03±3.86	19.174	2.000	16.07-19.77
Number of skipping in 30 seconds	29.52±6.41	6.47±4.03	24.522	1.910	21.18-24.90

Comparison between both groups ( HICT and LIIT),Number of pushups per one minute in HICT was 20.2±6.92 and in LIIT was 3.66±2.78 with the p value of <.001\* as shown in (table 2) ,similarly No.of leg levers per one minute in HICT was 20.35±5.59and in LIIT was 4.55±3.09 with the p value of <.0001\* in both groups.No. of burpees per one minute in HICT was 17.06±5.95 an in LIIT was 4.15±3.19 with mean value<.0001\* in both group.

#### IV. DISCUSSION:

Gibala and Martin undertook an effort in 2007 to determine how high-intensity circuit exercise affected health. Young, healthy college-aged men and women who have never been trained in a sport are chosen for this purpose. For two weeks, each individual underwent the Wingate test. Cycling for 30 seconds while facing heavy resistance is used in the test. After a 4-minute break, the test is repeated 4–7 times. According to this study, high-intensity training increases exercise tolerance in participants and has a positive link with aerobic energy metabolism. Even though after two weeks the experimental group's exercise tolerance has improved, the control group's has not<sup>18</sup>. A study by Dae Young Kim in 2021 that examined the effects of high-intensity circuit training on obesity indices, physical fitness, and browning factors in inactive female college students found changes in body composition after a 4-week high-intensity programme. Additionally, the post-exercise weight showed a significant decrease of about 2 kg (P=0.001) and the obesity indices of WC and BF% significantly decreased by about 1.74 cm (P=0.003). These two modifications were substantial. The muscle mass assessed before and after exercise showed no discernible difference<sup>19</sup>.

The goal of a 2013 study led by Quirico F. Pacelli and Marco Neri is to compare the unique impacts of endurance training, low intensity circuit training, and high intensity circuit training. Additionally, they are interested in examining the impact of high-intensity circuit training on middle-aged, overweight women's risk factors for heart illness. Three groups of participants were

formed; the first group engaged in high-intensity circuit training, the second and third groups engaged in endurance exercises. For a period of 12 weeks, each group engaged in three workouts per week. According to their findings, all three groups are highly effective in increasing triglycerides, lipoprotein, and blood pressure is more beneficial from high intensity circuit training than LICT and endurance training, according to research<sup>20</sup>. A recent study by Stauffenberg, Birgit Wallmann-Sperlich, et al. evaluated the effects of HICT alone or in combination with high-vol, LI exercise on changes in body composition, metabolic indices, quality of life, and functional strength. 22 female participants between the ages of 18 and 35 were chosen at random and split into two groups. Both groups completed a questionnaire about their medical history and underwent a basic physical examination. The first group engaged in three high-intensity circuit training sessions each week, while the second group engaged in one low-intensity, high-volume session and two high-intensity circuit training sessions. Data from both groups was gathered prior to and following the 9-week period. Researchers came to the conclusion that both workouts are very successful at increasing lean body mass, decreasing BMI , fat mass, and waist to hip ratio. Additionally, they demonstrate that high-intensity circuit training has more beneficial effects on raising maximum oxygen uptake<sup>21</sup>

#### LIMITATIONS:

In limitations the sample was collected from single setting only.Only short term effects of the interventions were investigated.Only females were included of reproductive age group.

#### V. CONCLUSION

This study concludes that high intensity circuit training in overweight and obese females improved functional strength. Therefore, High intensity circuit training can be used as one of the way to improve the functional strength in overweight and obese reproductive aged females.

#### CONFLICT OF INTEREST:

There was no conflict of interest.

#### FINANCIAL STATEMENT:

No funding were given by any authorities, it was a project of thesis of doctor of physical therapy.

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