ISSN No: 2456-2165 https://doi.org/10.38124/ijisrt/25may2241

# Hula Hooping for Health: Effects of Weighted Training on Fitness Outcomes in Overweight Adolescents

Dr. Sakshi Chature[1]*; Dr. Pradeep Borkar[2]

[1*]Post Graduate, [2]Professor

[1,2]Department of Sports Physiotherapy, Dr. APJ Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences, Loni, Ahmednagar, India

Corresponding Author: Dr. Sakshi Chature[1]*

Publication Date: 2025/06/28

**Abstract**

- ***Background:***

**Hula-hooping is an age-old dancing tradition that has seen resurgence as an energetic core exercise. The Hula Hoop (HL) is a widely used workout tool that involves a simple motion and a hoop that circles the waist and swings hips in an attempt to strengthen the core muscles. The increasing rates of overweight and obesity among college students are causing concern not just for individual health but also for the functionality of communities. According to research, the majority of college students do not follow dietary and physical activity recommendations, and 14% of typical students become overweight and enter the overweight category throughout their four years of study.**

- ***Objective:***

**To find effect of Weighted Hula Hoop Training Program (WHHTP) on core strength and aerobic capacity in Overweight students.**

- ***Methodology:***

**Institutional ethical approval was obtained. Consent was obtained from all the participants. 60 samples were taken based on eligibility criteria and divided into Group A (experimental group) and Group B (control group). Pre-assessment was done at Week 0. The experimental group received the WHHTP and regular exercise program for 3 sessions per week for 4 weeks. The control group received regular exercise program. Post-assessment was done at week 4.**

- ***Result:***

**Post intervention, it was seen that there was significant improvement for group A but not in group B. In VO2 max and plank, significant increase in aerobic capacity and core strength was seen in Group A. Between the group's comparison showed a significant difference in all tests i.e. Queens college step test and plank with a p value of <0. 0001.**

- ***Conclusion:***

**The study concludes that WHHTP is effective in improving core strength and aerobic capacity in overweight students.**

***Keywords:*** *Weighted Hula Hoop, Aerobic Capacity, Plank, Overweight Students.*

**How to Cite**: Dr. Sakshi Chature; Dr. Pradeep Borkar (2025) Hula Hooping for Health: Effects of Weighted Training on Fitness Outcomes in Overweight Adolescents. *International Journal of Innovative Science and Research Technology*,10(5), 4764-4769. https://doi.org/10.38124/ijisrt/25may2241

## I. INTRODUCTION

Hula-hooping is a traditional form of physical activity that has seen resurgence as an energetic core exercise. The Hula Hoop (HL) is a widely used workout tool that involves a simple motion and a hoop that circles the waist and swings hips in an attempt to strengthen the core muscles. The muscles in the lower limbs and trunk are activated during hula

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hooping. Consequently, hula hooping is widely considered a highly effective method of aerobic core training.

Due to its physical benefits for people of all ages, hula-hooping has long been a popular form of exercise. It's also a simple, enjoyable, low-impact, and high-energy workout. One of the newest workouts that is becoming more and more popular is hooping. Hooping has many advantages, such as stress release, weight loss, muscular toning, enhanced flexibility of the spine and pelvis, and greater bone strength.

The larger and heavier the hoop, the slower its rotation, making it easier to use. Hula hooping engages the lower limb muscles as well as the trunk muscles.[2] There is only one uncontrolled study that provides information on how hula-hooping affects body composition; the study found that hula-hooping reduced waist circumference.[3] Nevertheless, metabolic indices or the masses of muscle and fat were not measured in this investigation. It is unknown if metabolic parameters are altered by hula-hooping and, if they are, whether these changes are similar to those brought about by resistance or aerobic exercise.

A steady oscillatory motion and an unstable object must be maintained during hula hooping, which is a complex function requiring precise body structure and movement. Hula hooping involves moving the hula hoop parallel to the ground around the waist. The performer controls the amplitude and frequency of the hoop's oscillations synchronizing with their hips, knees, and ankles while engaging in oscillatory movement. To ensure that the hula hoop swings consistently around the waist, the torso is structured in an almost straight or neutral position with little movement and co-contraction of the torso muscles. When hula hooping, the torso muscles, lower abdominals, and other muscles are all engaged.

According to World Health Organization (WHO), it is the disease of developed countries that has recently become prevalent among Low and Middle-Income Countries (LMICs) especially among 340 million children's and also college going students. According to statistics, the prevalence of overweight and obesity among adults worldwide is 38.0% for women and 36.9% for men in both developed and developing nations.[3] Overweight and obesity is a major issue that has tripled in the past 30 years, across the globe.

Several previous studies have demonstrated the positive effects of hula hoop exercise on weight loss, waist and hip circumference, lipid profile, body composition, muscle strength and flexibility, core muscle mass, and core strength.[20] Hence we hypothesized that weighted hula hoop exercise (WHHE) may have impact on Core muscle strength and aerobic capacity in overweight students. Therefore, the purpose of this study was to examine the effects of weighted hula hoop exercise (WHHE) on Core muscle strength and aerobic capacity in overweight college students.

## II. MATERIALS AND METHODOLOGY

- *Design*

All the participants involved in the group were blinded. Randomization of participants was done and were randomly allocated in 2 groups which was performed using computer generated randomization method. The study was started after obtaining the Ethical Clearance from the Institutional ethical committee. The IEC no is Dr. APJAKCOPT/**BPT/UG/2023/11.**

- *Study Setting*

GYM Hall of Dr, APJ AK COPT, and PIMS (DU) Ahmednagar district Maharashtra, India.

- *Study Duration*

Jan 2023 to Feb 2024.

- *Sample Size Calculation*

Sample size was calculated using open Epi software, with power of 80% and 95% confidence interval. Grounded on the above-mentioned assumptions, the sample size needed for this study was 60 participants.

- *Participant Recruitment*

Participants with age ranging from 18 to 24 years-old, both male and female with BMI 25-29.9 kg/m2 overweight students, willing to sign the consent were included in the study. The exclusion criteria were as follows: (a) A prior history of spinal injury or any surgical procedures involving the spine or abdomen(b) Participants involved in other exercise routines prior to beginning of protocol(c) Any type of metabolic, cardiovascular and neurological illness (d) unable to keep the hula hoop at waist level for at least 20 minutes.

- *Randomization Allocation*

Until the intervention begins, the codes obtained from randomization were maintained in opaque sealed envelope. The allocation was done by sequentially numbered, opaque, sealed envelope (SNOSE).

ISSN No: 2456-2165 https://doi.org/10.38124/ijisrt/25may2241

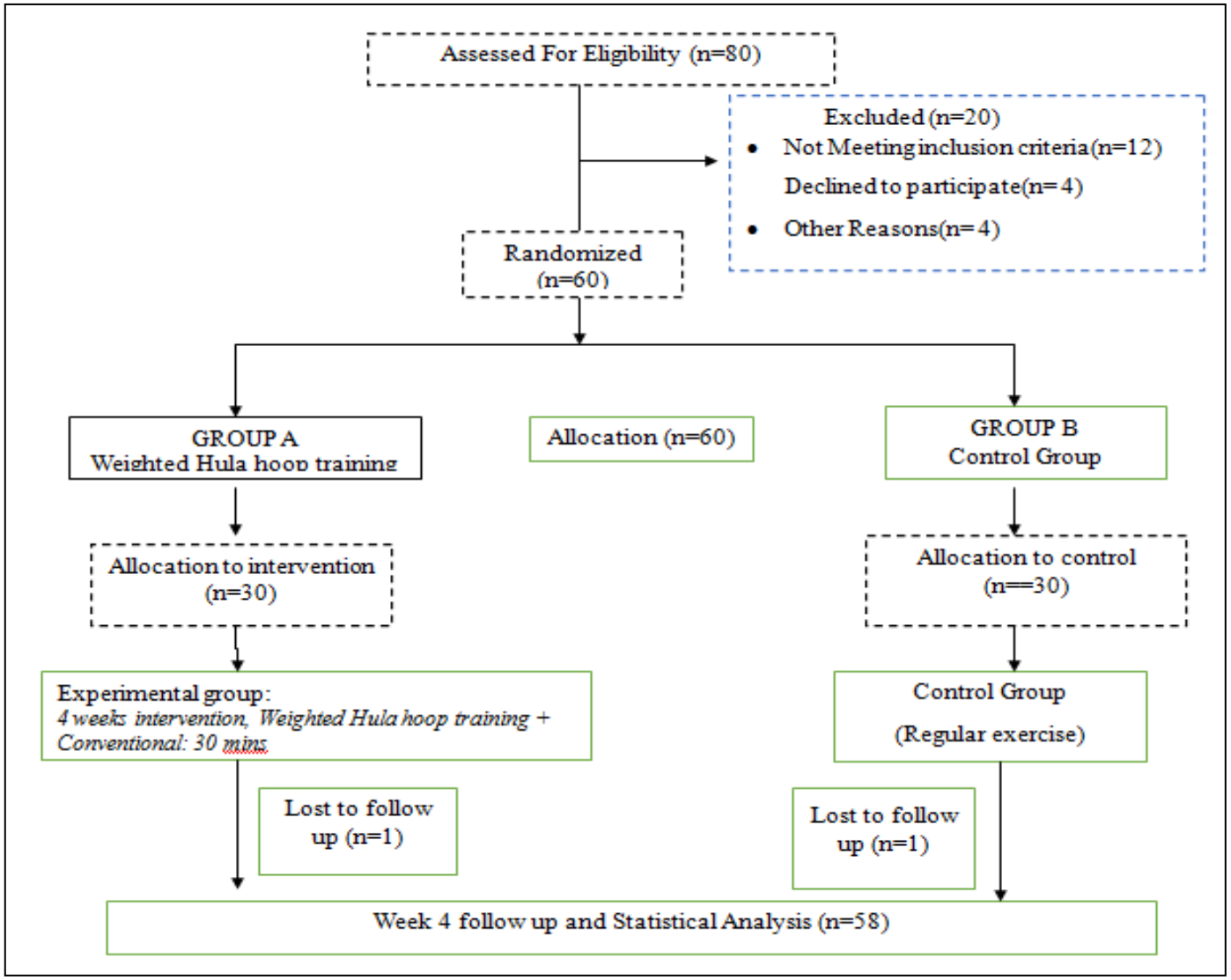


Fig 1 Design and Flow of Participants of the Trial

➢ *Procedure*

Participants performed a standardized warm-up protocol before the tests. The intervention group performed the WHHTP, while the control group followed the regular exercise regimen. Sessions were conducted on 3 days a week. Assessments for both groups were done at baseline and after 4 weeks. Demographic data were collected prior to the intervention. Aerobic capacity was evaluated using the Queen's College Step Test, and core strength was measured with the plank test.

➢ *Outcome Measures*

- *Aerobic Capacity:*

Queens's college step test used to measure the Vo2 max. Start by step up and step down on platform at a rate of 22 steps per minute for females and 24 steps per minute for males. The participants perform the step-up test for 3 minutes. After completion of test the heart rate are counted for 15 seconds from 5-20 seconds of recovery. Multiply this 15 second by 4 will give the beats per minute (bpm). Then by using the formula calculate the Vo2max.

- *Core Strength*

Plank test is a form of isometric core strength exercise used to improve core strength. Start with upper body supported by ground by elbows, forearm and legs straight line from head to toe. The test is over until participant is unable to hold the position.

➢ *Statistical Analysis*

Analyses was done using Instat software. Mean and standard deviation were used to describe quantitative variables. The mean between-group difference with in group was calculated by paired t- test and between the experimental and control groups were calculated with unpaired t-test. data reported with a 95% confidence interval.

## III. RESULTS

There was significant improvement in terms of VO2 MAX for group A but not in group B. In VO2 MAX and plank, significant increase in aerobic capacity and core strength was seen in Group A. Between the group's comparison showed a significant difference in all tests i.e. Queens college step test and plank with a p value of <0.0001.

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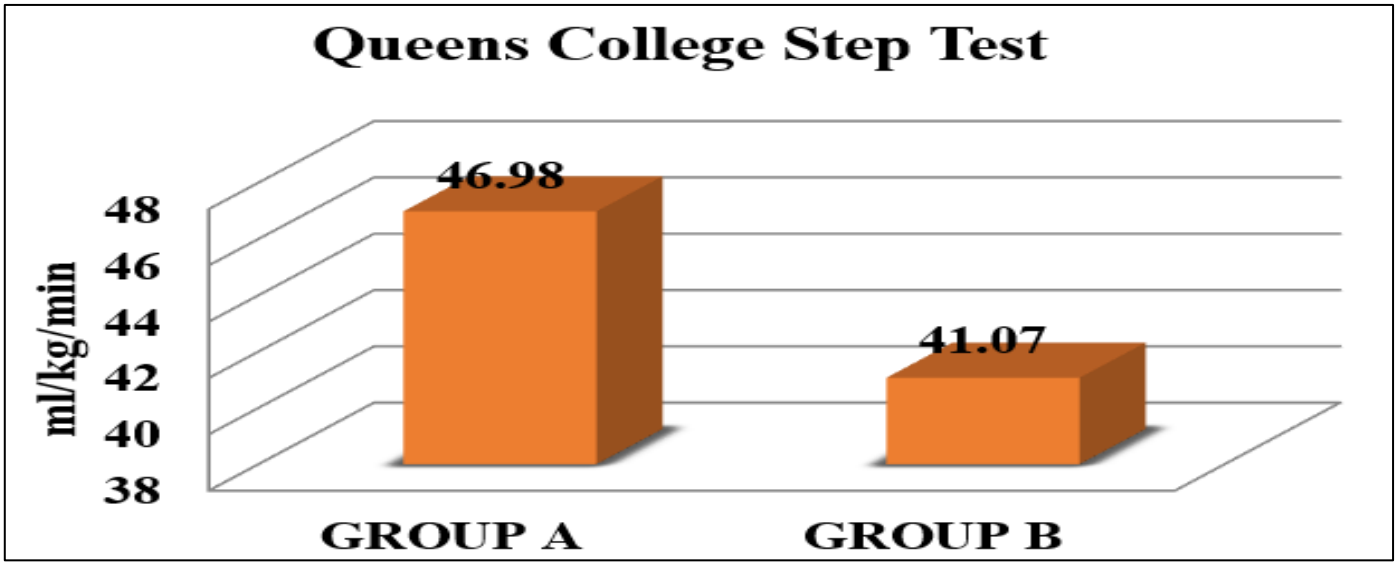

Fig 1 Queens College Step Test

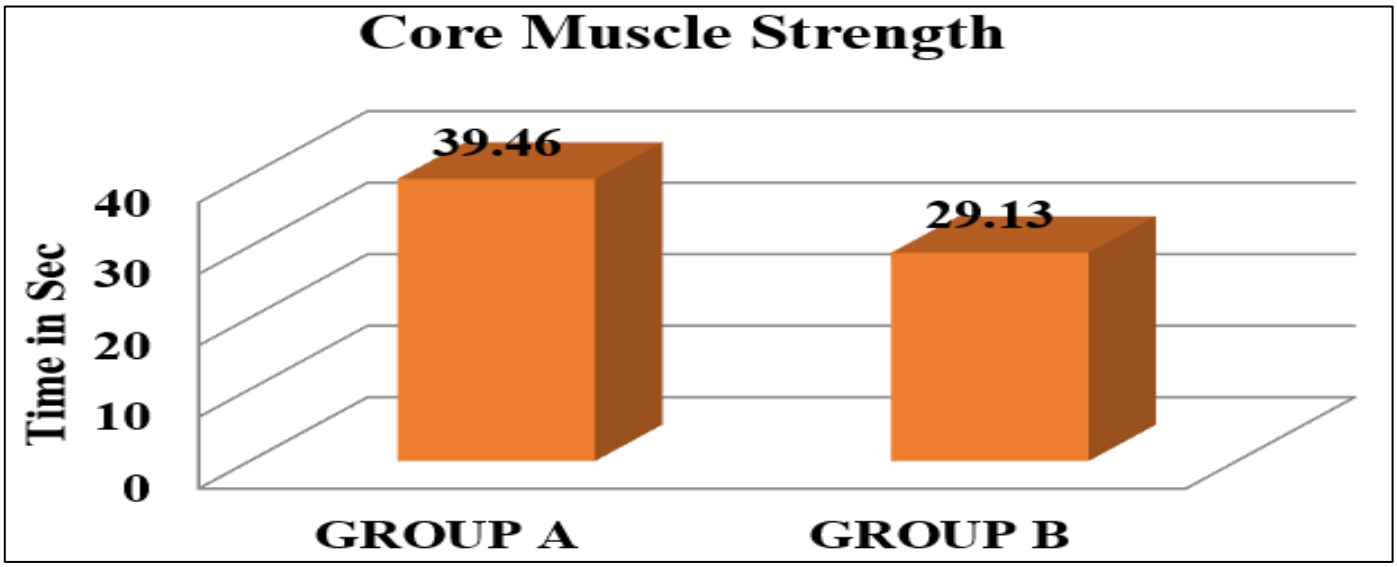

Fig 2 Core Muscle Strength

Table 1 Demographic Characteristics of Participants at the Baseline are Shown in Table 1

| Characteristics | Experimental (n=30) | Control (n=30) |
|---|---|---|
| Age, mean (SD) | 20.58 (4.33) | 21.12 (3.34) |
| Height, mean (SD) | 161.70 (3.41) | 162.36 (6.66) |
| Weight, mean (SD) | 76.13 (12.43) | 77.12 (11.20) |
| BMI, mean (SD) | 27.38 (4.09) | 28.21 (5.01) |

Table 2 Content and Progression of the Experimental Group.

| Conventional treatment | Volume |
|---|---|
| Warm up, Brisk Walk, Joint and Trunk Rotations | 3 -5 minutes |
| Weighted hula hoop exercise | 3 mins, 5 sets (90 sec break in between was permitted) |
| Cool down, Stretching of major group of muscles | 3 minutes |

Duration 30 – 40minutes, frequency of 3 days per week.

Table 3 Mean (SD) of Groups, Mean (SD) Within-Group Difference and Mean Between-Group Difference

| | Groups | Post Intervention (Mean±SD) | Mean Difference | t value | P value | Significance |
|---|---|---|---|---|---|---|
| VO2 MAX | A | 46.98±2.96 | 5.91 | 8.250 | <0.0001 | Extremely significant |
| | B | 41.07±2.46 | | | | |
| Plank | A | 39.46±8.93 | 10.33 | 5.144 | <0.0001 | Extremely significant |
| | B | 29.13±6.77 | | | | |

ISSN No: 2456-2165 https://doi.org/10.38124/ijisrt/25may2241

## IV. DISCUSSION

The purpose of the current study was to evaluate the effectiveness of Weighted Hula hoop training program on selective fitness variables in overweight students. We hypothesized that after training there would be improvement in aerobic capacity and core strength in overweight students. A weighted hula hoop training program was given so that it should benefit the overweight students.

A decrease in VO2 max is consequently a sign of a decreased tolerance or ability for exercise. Maximum cardiac output plus maximal arterial-venous oxygen differential result in it. [(4)] Group A (Experimental group) showed that there was significant improvement in Vo2max (46.98±2.96 to 41.07±2.46) as compared to Group B.

According to the Physical Activity Guidelines for Americans, adults should strive for 150 minutes or more each week of moderate-intensity activity. Exercise with weighted hula hoops can be enjoyable and beneficial for an individual. Traditional hula hooping has been shown to burn up to 210 calories in 30 minutes, according to some data. Regular hula hooping may be a more fun form of exercise than other options, like walking, according to a 2016 study. This probably applies to using weighted hula hoops as well. Furthermore, previous studies indicate that hooping can offer a strenuous, full-body workout.

In a study of adolescent girls with obesity, Bharath et al. [3] examined the effects of combined exercise on visceral adiposity and found that aerobic and resistance exercise decreased metabolic risk variables in obese teenagers. Furthermore, studies conducted by other authors on the benefits of mixed exercise in kids revealed that exercise treatments markedly decreased a number of cardiometabolic risk variables, including BMI. Other authors have observed that it did not significantly affect body weight and WC .[4, 5]

According to a prior study, there were differing views on how an exercise program affected the strength levels of teenage girls who were overweight or obese.[6,7]While some writers claimed that obese children and adolescents had less physical fitness than their peers of normal weight, six and seven other authors found that exercise had a favourable impact on muscle strength.

According to systematic studies, aerobic and strength training improves children's and adolescents' physical, physiological, and psychological outcomes more than therapies focused on a single modality. [8,9] But a number of variables, including ponderal status, sex, maturity, and baseline fitness, might influence how beneficial the intervention is. For instance, a recent study by Enríquez-del-Castillo et al. (2022) demonstrates how a child's developmental stage might influence how their physical fitness changes after engaging in an exercise program.[10] However, it is still unknown how various age groups differ during youth and how gender affects how beneficial an exercise program is for overweight adolescents.

During hula hooping, the spine remains relatively stable within the neutral zone, allowing motor control systems to receive precise proprioceptive feedback. Consequently, the lumbopelvic muscles learn to cooperate in order to keep the spine and pelvis in a neutral position when other body components are moving. These processes align with the idea of core stability training, which focuses on keeping the spine neutral throughout exercise and transitioning to functional activity. [17, 18]

This study revealed that a 4-week program of weighted hooping combined with the warm-up and cool-down exercises outlined here resulted in improvement in core strength and aerobic capacity. In this study, within the group comparison showed significant changes in both the groups. Significant difference was seen in pre and post values of the both groups, whereas between the groups comparisons showed significant results in Group A which was given the designed intervention with a mean difference of 5.91 and 10.33 for VO2 MAX and Plank respectively.

## V. CONCLUSION

The results of the present study showed that both training groups demonstrated improvements in aerobic capacity and core muscle strength. However, when comparing the groups, the WHHTP group was found to be more effective than the control group.

➢ *Implication*

We recommend that WHHTP program can be used as one of training methods in regular exercise sessions by overweight population to enhance their core strength and aerobic capacity.

- **Limitation:** Study is limited to single center. The gender co-relation for the outcome variables is not analyzed.
- **Funding:** None
- **Disclosure of Interest:** The Authors declares none of their interest's conflict with one another.

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