

A Comparative Study Between the Effect of Aerobic Exercise Versus Circuit Training on Obesity Among School Going Students

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ABSTRACT

Background and purpose: Overweight or obesity is defined as abnormal or excessive fat accumulation that negatively affects health. Obesity is a complex condition that Interweaves biological, developmental, environmental, behavior & genetic factor, it is a significant public health problem. The most Common cause of obesity throughout childhood & adolescence is an inequity in energy balance, that is excess calorie intake without appropriate calorie is expenditure. The purpose of the study is to compare the effect of aerobic exercise versus circuit training among school students

Method: 30 subject who underwent inclusion criteria were selected and randomized 15 subjects each into two groups Group A [aerobic exercise] and Group B[circuit training group].The BMI and waist circumference can be used as the primary outcome of the study.

Results: Analysis using Independent 't' test found that there is no statistically significant difference ($p < 0.05$) between aerobic exercise and circuit training on weight reduction.

Conclusion: Based on the results, this study concluded that aerobic exercise was effective in reduction of weight in adolescents with obesity.

KEYWORDS: Obesity, aerobic exercise, circuit training, BMI and waist circumference

INTRODUCTION

Obesity is defined as excessive fat accumulation that affects health. Obesity is a complex condition that Interweaves biological, developmental, environmental, behavior & genetic factor, it is a significant public health problem.^[1] The most Common cause of obesity throughout childhood & adolescence is an inequity in energy balance, that is excess calorie intake without appropriate calorie is expenditure.^[2]

The primary Cause of childhood obesity include lack of physical inactivity associated with mental issues, lack of physical fitness, the risk of developing

cardiovascular disease and compromised bone health.

In children overweight, obesity increase the risk of factors hypertension preliminary symptoms of cardiovascular disorder, Non-alcohol fatty liver disease (NAFLD), obstructive Sleep Apnea (OSN), dyslipidemia.^[3]

Aerobic exercises is physical exercise of low to high intensity which primarily depends on the aerobic energy generating process. It requires free Oxygen consumption and refers use of oxygen to meet energy demands during exercise via aerobic metabolism adequately.^[4]

Aerobic exercise can decisively improve heart rate, body condition and state of mind while doing regularly. [5] Over 20 years of research has shown that aerobic exercise is one of the best exercises, can do it in a safe and complete workout. [6] Aerobic exercise condition the heart and lungs to help to use oxygen more efficiently and help control in weight and reduce stress. [7]

Aerobic exercise provides sufficient cardio respiratory demand to promote weight loss. Aerobic conditioning exercise are used to reduce body weight, body fat and therefore changes the body composition. [8] Apart from walking and running as a means of aerobic exercise, various other forms of exercise to music models are used which include steps, hops, turns, jumps and other body movement showed that aerobic exercise would lead to notable changes in body fat percent, flexibility, agility, waist circumference and sub skin fold fat. [9]

Aerobic exercise helps to relax muscles tension and regular aerobic exertion increases the body production of endorphins (a natural opiate) and catecholamine (chemical substance) that helps to stabilize the moods. [10] The major benefit of aerobic exercise are a stronger and more efficiently operating heart and lungs, physical flexibility, conditioned muscle, proper use of fats effective burning of calories. [11]

In 1957, the Circuit training method was designed by Adamson and Morgan of Leeds University. It is the scientific arrangement of exercise perform symmetrically and repeatedly as circuit. Circuit training is the training method in which the certain various kinds of exercise are performed with or without apparatus with the given dosage training flexibility and mobility. [12]

Circuit training is veritably time efficient and an excellent way to ameliorate cardiovascular fitness & muscular strength and endurance. Circuit training will increase heart rate and continue through the entire circuit training due to the short rest periods, large muscles being worked together and a combination of upper, lower and whole body exercise. [13]

METHOD

The study was conducted at out patient department of JKK Munirajah Medical Research Foundation College Of Physiotherapy, Komarapalayam under the supervision of concerned authority. A total number of 30 subjects were selected by random sampling method after due consideration of inclusion and exclusion criteria and they all were divided into Group A[aerobic exercise} and Group B[circuit training] with 15 subjects in each group. A total duration of 5 session in a week for 12 weeks. The parameter used for this study was body mass index and waist circumference. Both male and female are included in this study with the age group of 14-18.

PROCEDURE

The total number of 30 subjects who were diagnosed as overweight and obesity are suitable for inclusion criteria were included for the study. After the informed consent obtained from them, the subjects will be divided into two groups.

Group A and Group B with 15 subjects in each group.

The Group A will engage in the aerobic exercise.

The Group B will engage in the circuit training.

Before starting of the exercise program there will warm period, and the end of the session there will be cool down period.

Warm period -dynamic stretching for 10 minutes.

Cool down period - static stretching for 10 minutes.

AEROBIC EXERCISE

The program included the warm up phase for 10 minutes. 30 minutes of aerobic exercise like walking, jogging, cycling, calisthenics, rhythmic exercises, continuous slow running, sit ups and cool down phase for stretching

Phase 1 : stretching of upper limb, trunk, lower limb muscles for 10 minutes.

Phase 2: Individualized walking, jogging, cycling, rhythmic exercises, continuous slow running, sit ups

Phase 3: Cool down exercise for 10 minutes

CIRCUIT TRAINING

Circuit training is one of the most popular exercise methods to build both muscular strength and endurance. The training program consisted of 10 types of resistance and aerobic exercise and was done 5 times per week for 12 weeks. Specifically, the resistance exercise program comprised of push-up, squat, crunches, lunge and

superman exercise. An aerobic exercise program comprised of light jumping, running on the spot, foot stamping, stepping and jumping jack.

Phase 1 : In Warm up period, dynamic stretching for 10 minutes.

Phase 2 : Resistance and aerobic exercise (push-up, squat, crunches, lunge and superman exercise, light jumping, running on the spot, foot stamping, stepping and jumping jack)

Phase 3 : In cool down period, static stretching for 10 minutes.

RESULTS AND TABLES

Table – 1: Comparison of BODY MASS INDEX Between Group - A And Group – B

The comparative mean values, mean difference, standard deviation and unpaired ‘t’ value between Group A and Group B on body mass index

BMI	Mean	Mean Difference	Standard Deviation	Un Paired ‘t’ Value
Group-A	28.47	5.27	4.99	2.93
Group -B	33.73			

The unpaired ‘t’ value of 2.93 was greater than tabulated ‘t’ value of 2.05, which showed that there was statistically difference at 0.05 level thus there is a significant improvements in Group-A when compared to Group-B.

Therefore, the study was rejecting the null hypothesis and accepting the alternative hypothesis.

Table -2: Comparison of Waist circumference Between Group - A And Group – B

The comparative mean values, mean difference, standard deviation and unpaired ‘t’ value between Group A and Group B on waist circumference

Waist circumference	Mean	Mean Difference	Standard Deviation	Un paired ‘t’ Value
Group -A	30.79	2.80	2.77	2.768
Group -B	33.69			

The unpaired ‘t’ value of 2.768 was greater than tabulated ‘t’ value of 2.05, which showed that there was statistically difference at 0.05 level thus there is a significant improvements in Group-A when compared to Group-B

Therefore, the study was rejecting the null hypothesis and accepting the alternative hypothesis.

DISCUSSION

Aerobic exercise produce energy using a continuous supply of oxygen to sustain the current level of oxygen without needing of additional energy from other sources.

Aerobic exercise decrease the both body weight and fat mass significantly.

Circuit training is useful for prevention and treatment of obesity. circuit training improve muscle strength, muscle endurance, flexibility and cardiopulmonary fitness. [14]

Based on the study of A Febin Jebaraj, Dr C Robert Alexander, the present study has

taken aerobic exercise and circuit training as a treatment program for obese adolescents. Based on the study of EP Parks, the present study has taken the body mass index and waist circumference as parameter of this study. ^[15]

IN THE ANALYSIS AND THE INTERPRETATION IN THE BMI OF GROUP A AND GROUP B

The unpaired 't' value of 2.93 was greater than tabulated 't' value of 2.05, which showed that there was statistically difference at 0.05 level thus there is a significant improvements in Group-A when compared to Group-B.

Therefore, the study was rejecting the null hypothesis and accepting the alternative hypothesis.

IN THE ANALYSIS AND THE INTERPRETATION IN THE WAIST CIRCUMFERENCE OF GROUP A AND GROUP B

The unpaired 't' value of 2.768 was greater than tabulated 't' value of 2.05, which showed that there was statistically difference at 0.05 level thus there is a significant improvements in Group-A when compared to Group-B

Therefore, the study was rejecting the null hypothesis and accepting the alternative hypothesis.

CONCLUSION

The study concluded that the aerobic training was more beneficial for weight reduction in obese adolescence than circuit training.

Declaration by Authors

Ethical Approval: Approved

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Conflict of Interest: The authors declare no conflict of interest.

REFERENCE

1. Panuganti, K. K., Nguyen, M., & Kshirsagar, R. K. (2022). Obesity. In *StatPearls*. StatPearls Publishing.
2. Kansra, A. R., Lakkunarajah, S., & Jay, M. S. (2021). Childhood and Adolescent Obesity: A Review. *Frontiers in pediatrics*, 8, 581461.
3. Močnik, M., & Marčun Varda, N. (2021). Cardiovascular Risk Factors in Children with Obesity, Preventive Diagnostics and Possible Interventions. *Metabolites*, 11(8), 551.
4. Patel, H., Alkhwam, H., Madanieh, R., Shah, N., Kosmas, C. E., & Vittorio, T. J. (2017). Aerobic vs anaerobic exercise training effects on the cardiovascular system. *World journal of cardiology*, 9(2), 134–138
5. Nystoriak, M. A., & Bhatnagar, A. (2018). Cardiovascular Effects and Benefits of Exercise. *Frontiers in cardiovascular medicine*, 5, 135.
6. Yang Y. J. (2019). An Overview of Current Physical Activity Recommendations in Primary Care. *Korean journal of family medicine*, 40(3), 135–142.
7. Your lungs and exercise. (2016). *Breathe (Sheffield, England)*, 12(1), 97–100. <https://doi.org/10.1183/20734735.ELF121>
8. 8 .Gerald F. Fletcher, MD, Gary J. Balady, MD, Ezra A. Amsterdam, MD, Exercise Standards for Testing and Training Volume 104, Issue 14, 2 October 2001;
9. 9.Tomassoni, T. L., Blanchard, M. S., & Goldfarb, A. H. (1985). Effects of a Rebound Exercise Training Program on Aerobic Capacity and Body Composition. *The Physician and sportsmedicine*, 13(11), 110–115.
10. 10. Heijnen, S., Hommel, B., Kibele, A., & Colzato, L. S. (2016). Neuromodulation of Aerobic Exercise-A Review. *Frontiers in psychology*, 6, 1890.
11. 11. Colberg, S. R., Sigal, R. J., Fernhall, B., Regensteiner, J. G., Blissmer, B. J., Rubin, R. R., Chasan-Taber, L., Albright, A. L., Braun, B., American College of Sports Medicine, & American Diabetes Association (2010). Exercise and type 2 diabetes: the American College of Sports Medicine and the American Diabetes Association: joint position statement. *Diabetes care*, 33(12), e147–e167. <https://doi.org/10.2337/dc10-9990>

12. Hughes, D. C., Ellefsen, S., & Baar, K. (2018). Adaptations to Endurance and Strength Training. *Cold Spring Harbor perspectives in medicine*, 8(6), a029769. <https://doi.org/10.1101/cshperspect.a029769>
13. Ramos-Campo, D. J., Andreu Caravaca, L., Martínez-Rodríguez, A., & Rubio-Arias, J. Á. (2021). Effects of Resistance Circuit-Based Training on Body Composition, Strength and Cardiorespiratory Fitness: A Systematic Review and Meta-Analysis. *Biology*, 10(5), 377. <https://doi.org/10.3390/biology10050377>
14. Kim, J. W., Ko, Y. C., Seo, T. B., & Kim, Y. P. (2018). Effect of circuit training on body composition, physical fitness, and metabolic syndrome risk factors in obese female college students. *Journal of exercise rehabilitation*, 14(3), 460–465.
15. Parks, E. P., Zemel, B., Moore, R. H., & Berkowitz, R. I. (2014). Change in body composition during a weight loss trial in obese adolescents. *Pediatric obesity*, 9(1), 26–35

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