



ISSN: 2456-0057

IJPNPE 2023; 8(2): 605-607

© 2023 IJPNPE

www.journalofsports.com

Received: 02-08-2023

Accepted: 03-09-2023

Dr. Dilip Biswas

Assistant Professor and Head,
Department of Physical
Education, Bajkul Milani
Mahavidyalaya, West Bengal,
India

A evaluational study on the effects of weight training, circuit training and aerobics on muscle mass of overweight students

Dr. Dilip Biswas

DOI: <https://doi.org/10.22271/journalofsport.2023.v8.i2i.2859>

Abstract

Overweight as one of the today's most important public health issues, which is escalating as a global epidemic. The purpose of the present study was an endeavor to the best method of handling overweight. Out of ninety-six selected participants from fluvio coastal zone of west Bengal, India on the basis of BMI, eighty overweight girls (average age:20) were consider for the study. The subjects were divided into four groups (20 for each group) randomly namely Weight Training Group (WTG), Aerobic Training Group (ATG), Graded Circuit Training Group (GCTG) and Control Group (CG). Separately designed 12 weeks training programme for WTG, ATG and GCTG was applied on the subjects at morning between 8.00 am to 9.15am for three alternative days per week. After every four weeks, total load was increased. Pre and post test on the groups were conducted to measure the training effect on Body Muscle Mass of the subjects. The collected data were statistically analyzed by using the analysis of Co-variance ($p < 0.05$) to determine differences, the LSD test was applied as a post hoc test to find out the paired mean differences. From the obtaining result, it was concluded that weight training, aerobics and graded circuit training are found to be effective for improvement of Hip Circumference of overweight college girls.

Keywords: Overweight, weight training, aerobics, graded circuit training, muscle mass

Introduction

Muscle Mass is one of the Anthropometrical items that indicates the risk issues due to overweight of a person. Skeletal muscles, smooth muscles and body water jointly build the Muscle Mass of our body. Muscles are the machine of our body which exploits our body energy. With the enhancement of muscle mass in our body, the energy (calories) exploitation elevates. As a result, the rate of BMR rises up with the burning of extra fat stored in body. This process leads the weight loss of our body in a healthy way. With a regular training, the Muscle Mass of our body increases and at the same time the calories expenditure also increases. Muscle growing up and shedding fat occur jointly though the process of them are different. Muscle uses calories from stored fat of our body at the time of activity and systematic regular physical activity results growing up muscles in size and in number. The more muscle, the more calories burning. Thus Muscle Mass also a determining factor of body composition.

Statement of the Problem

The intention of the research work was to find out the effects of 12 weeks separately designed three different types of training-i.e. i) Weight Training ii) Aerobics Training and iii) Graded Circuit Training on muscle mass and compare the results to identify the impacts of those training on Overweight college girls.

Materials and Methods

96 overweight female students of "Fluvio-Coastal morphological zone" at Purba Medinipur district of West Bengal, India, were chosen randomly from Bajkul Milani Mahavidyalaya, Kadmbini Women's College of Education, Vivekananda College of Education, and Sri

Corresponding Author:

Dr. Dilip Biswas

Assistant Professor and Head,
Department of Physical
Education, Bajkul Milani
Mahavidyalaya, West Bengal,
India

Ramkrishna College of Education. 18-22 years old subjects were selected using B.M.I of the subjects. Out of 96 chosen overweight students eighty were finalised as “selected subject” and their average age was 20 years. 4 groups namely – WTG, ATG, GCTG and CG were formed at random and there have 20 girls in each group. Students underwent Weight Training (WT), Aerobics (AT) and Graded Circuit Training (GCT). All the tests of muscle mass were conducted in the gymnasium of Bajkul Milani Mahavidyalaya before the beginning of the training (Pre-Training), after every four weeks to assess and determine the rate of increment of load and at the end of training (Post Training). The training programmed was scheduled at 8.00 A.M to 9.15 A.M including warm up and cool down in order to minimize the effect of diurnal variation. Separately designed 12 weeks training programmes for all the independent variables were applied on subjects for three alternative days per week. Bio electrical impedance was used for testing the variables. After every 4 weeks of the experimental period, further load was

increased by considering individual ability through test-retest method for all the experimental groups. After end of 12 weeks’ training programme, muscle mass was measured. Co-variance (ANCOVA) was used to analyse the collected data to determine the differences (if any) among the groups of dependent variables. LSD test is applied for post hoc test to identify difference between paired mean. 0.05 level of confidence was set as the level of significance.

Result of the Study

Above table presented the evidence that Pre-Test “F” ratio ‘1.434’ of was found lower than the table value [1.434 <tab_{0.05}(3, 76)=2.72]. The Post Test “F” ratio ‘1.013’ was lower than table value [1.013 <tab_{0.05}(3,76)=2.72]. The calculated Adjusted Post Test Mean “F” value ‘29.887’ was found statistically significant [F_{0.05}(3, 75) < 29.887]. To identify the critical difference of Adjusted Post Test Means, the LSD test has been used and it has been analysed in Table no. 35

Table 1: Analysis of co-variance on muscle mass of overweight college girl students

Test		WTG	ATG	GCTG	CG	Source of Variance	Sum of Square	Degree of Freedom	Mean Square	F
Pre Test	Ms	36.783	36.535	37.905	38.03	AMG	35.01	(K-1)=3 (N-K)=76	11.67	1.434
	SD	±2.7390	±2.8290	±2.8290	±2.9831	WI	618.29		8.135	
Post Test	Ms	38.385	37.255	38.76	38.01	AMG	24.78		8.26	1.013
	SD	±2.8193	±2.7797	±2.8140	±3.0041	WI	619.57		8.15	
Adjusted Post Test Ms		38.805	38.015	38.18	37.31	AMG	25.41	(K-1)=3 (N-K-1)=75	8.47	29.887
						WI	21.26		00.2834	

* Significant table value: F_{0.05}(3, 76) = 2.72; N = 80 (N= subjects’ number); F = ‘F’ ratio; Ms = Means; S D = Standard Deviation; AMG = Among; WI = Within.

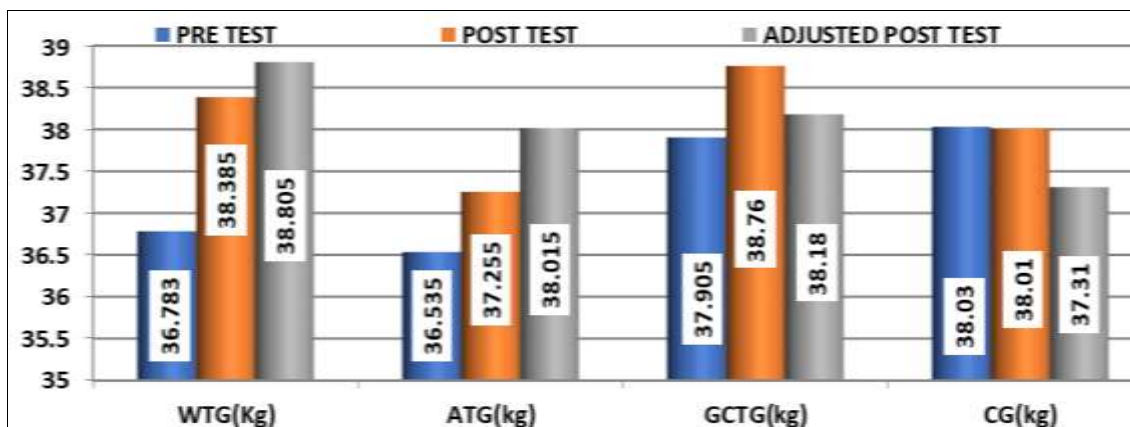


Fig 1: Graphical presentation of result on muscle mass of overweight college girl students

Figure- 58: Mean of Muscle Mass on different training groups of Overweight college girl students

Table 2: Analysis of critical difference of adjusted post-test means on muscle mass of overweight college girl students

WTG	ATG	GCTG	CG	MD	CD (5%)
38.805	38.015			0.79NS	1.054
38.805		38.18		0.09NS	
38.805			37.31	1.49*	
	38.015	38.18		0.165NS	
	38.015		37.31	0.70NS	
		38.18	37.31	0.87NS	

Significant level: 0.05; NS=Not Significant; MD= Mean Difference; CD=Critical Difference

The above table has confirmed that the difference between WTG and CG was significant. The results of above table have also provided evidence that difference in Mean of Adjusted

Post Test between this two groups was higher significant than other pair groups.

Discussion of the Findings

Muscle Mass of different training groups on overweight college girl students has improved significantly. The results were obtained from the comparison with the data of CG. Finding of this research work has revealed that (Table no.1 and 2) the difference between WTG and CG was significant. Besides, the results of the present study were supported by some related findings of various researchers (Liao CD, *et al.*, 2018 [4], Stuart M. Phillips and Richard A. Winett., 2010) [6] and, Bagavinar K, Kamalakkannan K., 2013) [1]. It has pointed out that the level of Muscle Mass improves if organised training is employed. The subjects who underwent strength training for six weeks demonstrated a significant difference in lean body mass after the completion of the programme,

(Lehri, A. and Mokha, R.,-2006) ^[3] may be due to the muscle protein synthesis has been shown to be stimulated by resistance exercise as long as the intensity of exercise is enough to challenge the muscles (Tipton and Wolfe,-2001) ^[7]. A recent study of Van Der Heijden GJ, *et al.*, (2010) ^[8] showed that a 12-week controlled resistance exercise programme; increased weight, lean body mass, and hepatic insulin sensitivity in 12 obese adolescents, with no effect on the metabolically active fat tissue. On the other hand, overweight women developed greater maximal oxygen uptake after three months of endurance training, (Brandenburg SL, *et al.*,1999) ^[2] and this it is statistically significant because it increases total body fat-free mass noted after mixed endurance training (Maiorana A, *et al.*, 2001) ^[5]. Here, the Weight Training group among all the training groups has showed the significant improvement in muscle mass might be due to the hypertrophy of the muscle for applying the training. The control group showed no change in muscle mass and, Aerobics Training Group and Graded Circuit Training Group showed improvement but statistically not significant may be due to lack of training (for control group) and discrepancy of intensity, volume or period of training (for above mentioned two experimental training groups). Therefore different types of specific training plans may be enough to influence the Muscle Mass of the Overweight college girl students.

Conclusion

From the obtaining result, it was concluded that weight training, aerobics and graded circuit training are found to be effective for improvement of Hip Circumference of overweight college girls.

References

1. Bagavinar K, Kamalakkannan K. Effect of aerobic training, aquatic training and combined training on selected physical fitness variables among Obese College Men. International Journal of Physical Education Sports Management and Yogic Sciences, 2013, III(XII).
2. Brandenburg SL, Reusch JE, Bauer TA, Jeffers BW, Hiatt WR, Regensteiner JG. Effects of exercise training on oxygen uptake kinetic responses in women with type 2 diabetes. *Diabetes Care*. 1999;22(10):1640-6. PMID:10526728.DOI:10.2337/diacare.22.10.1640
3. Lehri A, Mokha R. Effectiveness of aerobic and strength training in causing weight loss and favourable body composition in females [online]. *Journal of Exercise Science and Physiotherapy*. 2006;2:96-99.
4. Liao CD, Tsao JY, Huang SW, Ku JW, Hsiao DJ, Liou TH. Effects of elastic band exercise on lean mass and physical capacity in older women with sarcopenic obesity: A randomized controlled trial. *Sci. Rep.* 2018;8(1):2317. Doi: 10.1038/s41598-018-20677-7. PMID:29396436.PMCID:PMC5797161.DOI:10.1038/s41598-018-20677-7
5. Maiorana A, O'Driscoll G, Cheatham C, Dembo L, Stanton K, Goodman C, *et al.* The effect of combined aerobic and resistance exercise training on vascular function in type 2 diabetes. *J Am. Coll. Cardiol.* 2001;38(3):860-6. PMID:11527646.DOI:10.1016/s0735-1097(01)01439-5
6. Stuart Phillips M, Richard Winett A. Uncomplicated Resistance Training and Health-Related Outcomes: Evidence for a Public Health Mandate. *Curr. Sports Med. Rep.* 2010;9(4):208-213. doi: 10.1249/JSR.0b013e3181e7da73

7. Tipton KD, Wolfe RR. Exercise, protein metabolism, and muscle growth. *Int. J Sport Nutr. Exerc. Metab.* 2001;11(1):109-32. PMID:11255140.DOI:10.1123/ijsnem.11.1.109
8. Van der Heijden GJ, Wang ZJ, Chu ZD, Sauer PJ, Haymond MW, Rodriguez LM, *et al.* A 12-week aerobic exercise program reduces hepatic fat accumulation and insulin resistance in obese, Hispanic adolescents. *Obesity (Silver Spring)*. 2010;18(2):384-90. Doi: 10.1038/oby.2009.274. Epub 2009 Aug 20. PMID:19696755. DOI:10.1038/oby.2009.274