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A comparative study on the impacts of training on hip circumference of college girls

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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. 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 Hip Circumference 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, overweight, weight training, aerobics, graded circuit training, hip circumference

Introduction
According to W.H.O, 'Overweight or Obesity is the unusual or unnecessary too much fat gathering in human body which is harmful to health.' It may be clarified as accumulation of excessive fat in the body than optimally should have to be existed. Equation of overweight in relevance to the food and lifestyle may be outlined as Overweight = plentiful food provides ± inactive lifestyles. A healthy body necessitates the least amount of fat for the right functioning of our secretion system, immune systems, genital system, and beside of these activities, it conjointly executes the absorption and insulation of our body and stores up energy for a future emergency. However, once the gathered fat becomes excessive, it adversely affects our movement and flexibility. Most of all, overweight alters a human figure. Hip Circumference is one of the Anthropometrical items that indicates the risk issues due to overweight of a person. Hip Circumference is a measurement over the hips to determine maximum length covered over the buttocks. Generally, a tape or self-tensor tape is used to take the measurement of Hip Circumference. A tester should have to be conscious about the setting of the tape. The tape should be firmly grasped to ensure the shape of the hips. Hip Circumference measurement is a vital assessment system that determines collective body fat around the buttock and it may indicate the reflection of unhealthy lifestyle. In case of overweight individual, it ranges from 94 to105 cm for men and 97 to108 cm women. A person at or over the above-mentioned range should have to consult with a physician or fitness expert to lose the weight. A person with elevated Hip Circumference may be at risk of various health problems.

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 Hip Circumference and compare the results to identify the impacts of those training on Overweight college girls.

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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 and other three nearby colleges. 80 students were finalised as "selected subject" and their average age was 20 years. 4 equal groups namely – WTG, ATG, GCTG and CG were formed at random. Students underwent Weight Training (WT), Aerobics (AT) and Graded Circuit Training (GCT). All the tests of Hip Circumference 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. Self-extensor tape was used for taking the measurement of the hip circumference. 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, Hip Circumference data was collected. 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

Table 1: Analysis of co-variance on hip circumference of overweight college girl students

Test		W T G	A T G	G C T G	C G	Source of Variance	Sum of Square	Degree of Freedom	Mean Square	F
Pre Test	Ms	102.1805±3.0277	100.1215±3.6712	100.64±3.9478	99.638±3.3924	AMG	72.9177	(K-1) = 3 (N-K) = 76	24.3059	1.9546
	S D					WI	945.0508		12.4348	
Post Test	Ms	98.8105±2.5588	96.8655±3.4885	97.578±3.5563	100.32±3.0895	AMG	137.7023		45.9007	4.4878
	S D					WI	777.3057		10.2277	
Adjusted Post Test Ms		98.7819	96.8840	97.1866	100.7208	AMG	194.4807	(K-1) = 3 (N-K-1) = 75	64.8269	26.0713
						WI	186.4891		2.4865	

* 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.

Above table no. 1 shows the tabular presentation of means and Standard deviations of Hip Circumference on WTG, ATG, GCTG and CG and also computation of Covariance on those four groups. The table also presented the evidence that the Pre-Test Mean (Mn) ± Standard Deviation (SD) of WTG, ATG, GCTG and CG were found 102.1805±3.0277, 100.1215±3.6712, 100.64±3.9478 and 99.638±3.3924 and Pre-Test "F" ratio '1.9546' was found lower than table value [1.9546 <$tab_{0.05}$(3,76)=2.72]. The Post Test Mean (Mn) ± Standard Deviation (SD) of WTG, ATG, GCTG and CG were found 98.8105±2.5588, 96.8655±3.4885, 97.578±3.5563 and 100.32±3.0895 respectively and Post Test "F" ratio '4.4878' was higher than table value [4.4878 >$tab_{0.05}$(3,76)=2.72]. The Adjusted Post Test Means of WTG, ATG, GCTG and CG were 98.7819, 96.8840, 97.1866 and 100.7208 respectively. The calculated Adjusted Post Test Mean "F" value '26.0713' was found statistically significant [$F_{0.05}$ (3, 75) < 26.0713]. To identify the critical difference of Adjusted Post Test Means, LSD test has been used and it has been analysed in Table no. 25.
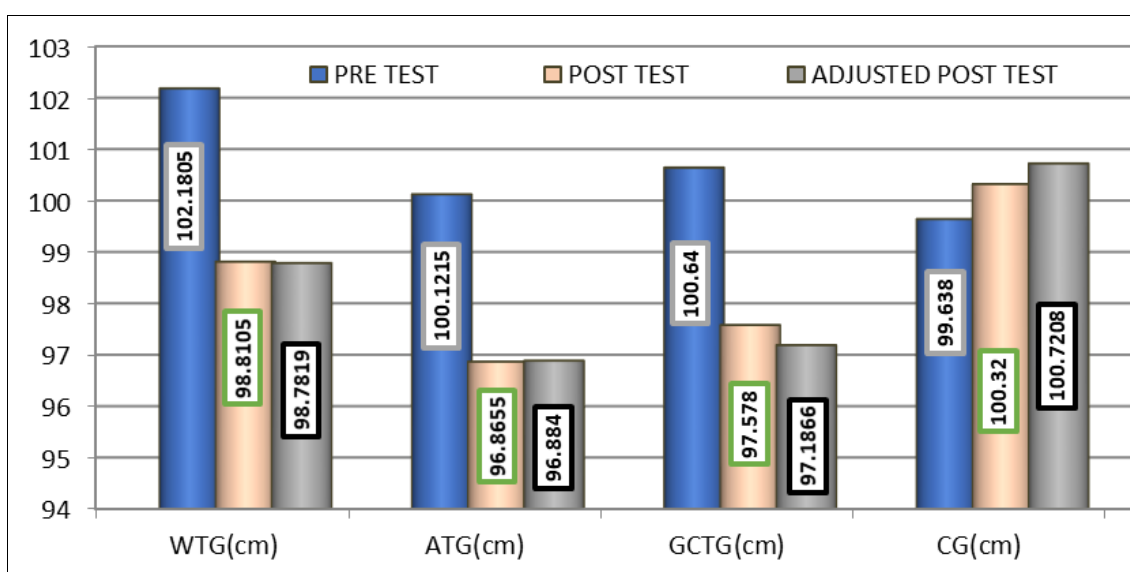
Fig 1: Graphical presentation of result on hip circumference of overweight college girl students

Figure 1: Mean of Hip Circumference on different training groups of Overweight college girl students

Table 2: Analysis of critical difference of adjusted post test means on hip circumference of overweight college girl students

W T G	A T G	G C T G	C G	M D	C D (5%)
98.7819	96.8840			1.8979*	
98.7819		97.1866		1.5953*	
98.7819			100.7208	1.9389*	0.9873
	96.8840	97.1866		0.3026NS	
	96.8840		100.7208	3.8368*	
		97.1866	100.7208	3.5342*	

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

The Adjusted Post Test Mean analysis of Hip Circumference presented at above table has confirmed that the differences between WTG and A T G, WT G and GCTG, WTG and CG, ATG and CG, GCTG and CG were significant. The results of this table have also provided evidence that Adjusted Post Test Mean difference between ATG and CG was higher significant than other pair groups.

Discussion of the findings
Hip Circumference of different training groups on overweight 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. 24) the differences between WTG and ATG, WTG and GCTG, WTG and CG, ATG and CG, GCTG and CG were significant. This finding on Hip Circumference has also reflected that (Table no. 25) the difference between ATG and CG has confirmed highest significant result. Besides, the results of the present study were supported by some related findings of various researchers (Janssen I, Katzmarzyk PT and Ross R,-2004, Kavak V,-2014, Melam GR, et al.,-2016) [2, 3, 4]. It has pointed out that the level of Hip Circumference improves if organised training is employed. Mixed endurance strength training leads to a greater decrease in hip circumference of obese women, (Willis et al.,-2012) [5] whereas, waist, hip circumference and waist-to-hip ratio were significantly became lower as circuit activity increases among overweight females. (Holcomb CA, et al.,-2004) [1]. YU Lirong, et al., (2017) [6] described the Aerobics exercise as a source of energy by their skeletal muscle, thereby effectively reducing body fat the content of obese patients that lead to decrease waist circumference, hip circumference, waist hip ratio also significantly. Aerobics training group, in present study, has shown better result than other two experimental groups may be due to more body fat reduction and localized exercise. In contrary, no significant difference in hip circumference has been identified between the ATG and GCTG may be due to the training exercises load applied on these two groups were equivalent and statistically the improvement of the groups were almost identical. Therefore, different types of specific training plans may be enough to decrease the Hip Circumference 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.

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