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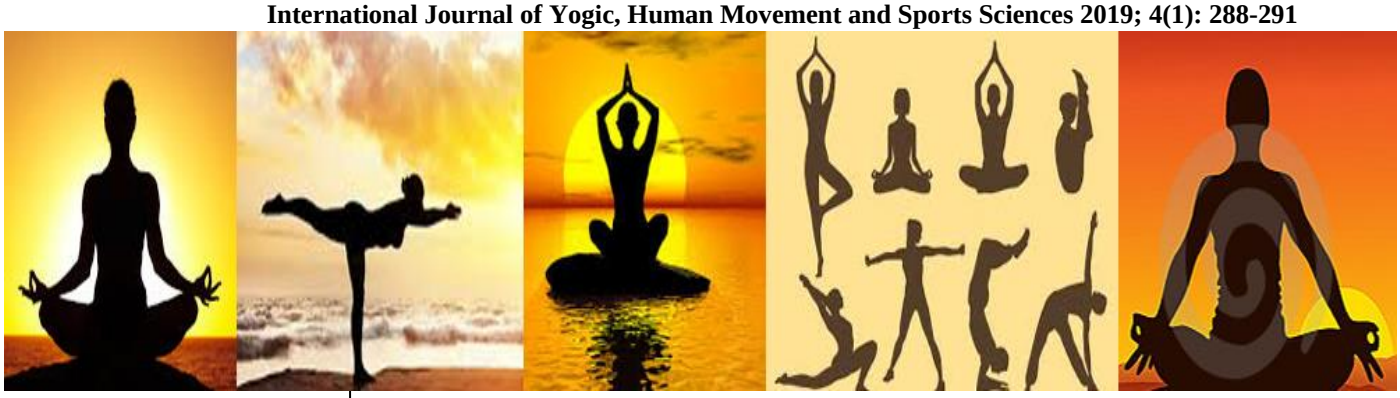

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Effects of weight training aerobics and graded circuit training on body mass index and waist to hip ratio of overweight students

Dilip Biswas and Dr. Ashim Kumar Bose

Abstract
The World Health Organization (WHO) describes Overweight as one of today's most important public health problems, which is escalating as a global epidemic. The purpose of the present study was an endeavour to evaluate the best method for handling Overweight. Out of 96 selected participants from Fluvio Coastal zone of West Bengal, India on the basis of BMI, 80 overweight girl (Age ranged: 20±2 years) were considered for the study. The subjects were divided into four groups (20 for each group) randomly namely Weight Training Group (WTG) Aerobics Training Group (A T G) 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-9.15am for three alternate days a week. After every four weeks, total load was increased. Pre and post-test on all the groups were conducted to measure the training effect on Body Mass index(BMI) and Waist to Hip Ratio(WHR).They were statistically analysed by using the analysis of Co-variance ($p< 0.05$) to determine the differences and LSD test was applied as a post hoc test to find out the paired mean differences.

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

Introduction
The contemporary way of life and busy schedule of daily work is such that technological advancement has thrust a guy to centre of his concentration more on intellectual and less on physical activities that directs to shape mutilation and damage the usual functioning of human physiological mechanism. Decreasing the function of the locomotors, cardiovascular and respiratory systems are the characteristics of health disorder of sedentary lifestyle. The hypokinetic lifestyle leads a human being to be burdened by the extra accumulated weight (Overweight) projected on him through the imbalance of calories intake and expenditure. The World Health Organization (WHO) defines overweight and obesity as the "abnormal or excessive fat accumulation that will impair health." More concisely, it may be explained as the gathering of excess body fat than optimally has to be possessed by someone, is overweight or obesity. In the present study, the researcher intended to observe the effects of the different types of sports training (as it use at sports field according to the need of the requirement of the specific sports) i.e. weight training, Aerobics and graded circuit training on the overweight girl students of Fluvio-Coastal of Purba Medinipur, West Bengal, India. When it involves fat loss, most of the people lead off a programme of cardio and fast. Weight training is simply an associate afterthought. Whereas cardio burns calories and fat once you are performing arts it, weight training has what's called high "Excess Post-Exercise O2 Consumption. Aerobics have typically been developed as an aerobic exercise to reduce body compositions as well as improve physical fitness and performance. Aerobics training provides sufficient cardio respiratory demand to promote weight loss in female. Aerobics training activities are used to decrease body weight and body fat, and thus to change body composition. Apart from walking and running as a means of aerobic exercise used to decrease body weight and change body composition, various other exercise to music models are used which include steps, hops, turns, jumps, and other body movements showed that aerobics training would lead to significant changes in body fat percent, flexibility agility waist circumference and sub skin folds fat.

Circuit training refers to doing exercises one after another, with very little rest so that your heart rate stays elevated to burn more calories. By not resting very long between each exercise, the heart and lungs should work and turn the session into cardiovascular work and should have to stay in the "fat-burning zone. The best training is the one that the performer attracted to stick on the jab and have fun with and will help to lose weight and stay in shape. Body Mass Index, or BMI, is utilized as a screening tool for the overweight or bodily property. BMI can be somebody's weight in kilograms divided by the sq. of height in meters. Though it does not actually measure the percentage of body fat, it is used to estimate a healthy body weight based on a person's height. Due to its ease of measurement and calculation, it is the most widely used diagnostic tool to identify weight problems within a population, usually whether individuals are underweight, overweight or obese. Waist–hip ratio (WHR) is the dimensionless ratio of the circumference of the waist to that of the hips. The WHR has been used as an associate degree indicator or lives of health and the risk of developing serious health conditions. Research shows that folks with "apple-shaped" bodies (with a lot of weight around the waist) face a lot of health risks than those with "pear-shaped" bodies. WHR is used as a measurement of overweight and obesity, which in turn is a possible indicator of other more serious health conditions.

The statement of the problem

The researcher was interested to assess the effects of weight training, aerobics and graded circuit training Body Mass Index (BMI) and Waist to Hip Ratio of overweight college girl students.

Materials and Methods

The study was a four group's pre-test post-test design with 80 subjects (Age ranged: 20±2 years). Subjects were selected at random from Bajkul Milani Mahavidyalaya, Kadambini Women's College of Education, Vivekananda College of Education, Sri Ramkrishna College of Education, Purba Medinipur, and West Bengal, India on Fluvio Coastal Plain on the basis of BMI. The subjects were divided into four groups randomly namely Weight Training Group (WTG) Aerobics Training Group (ATG), Graded Circuit Training Group (GCTG) and Control Group (CG). Each group had twenty subjects. The experimental protocol designed by the researcher with the help of respective field experts. Selected exercise for different experimental groups were carefully and systematically performed by the subjects up to twelve weeks thrice a week for one hour and fifteen minutes a day. Separately designed training programme for WTG, ATG and GCTG was applied on the students in the morning between 8.00 am-9.15am including warm up and warm down. After every four weeks total load was increased. Pre and post test on all the groups were conducted to measure the training effect on Body Mass index (BMI) and Waist to Hip Ratio (WHR). All the collected data were statistically analysed by using the analysis of Co-Variance (ANCOVA) to determine the effects and differences among the Groups on Body Mass Index and Waist to Hip Ratio. Whenever they obtained 'F' ratio was found to be significant, the LSD test was applied as a post hoc test to find out the paired mean differences.

Result of the Study

Table 1: Analysis of Covariance on Body Mass Index

Test		WTG	ATG	GCTG	CG	Source of Variance	Sum of Square	Degree of Freedom	Mean Square	F Ratio
Pre Test	Mean	26.9926	26.8418	26.9336	26.8972	Among	0.2406	K-1=3 N-K=76	0.0802	0.0531
	SD	± 1.1935	± 1.3824	± 1.0487	± 1.2669	Within	114.7734		1.5101	
Post Test	Mean	24.9721	25.1016	25.3867	26.0040	Among	53.1701		17.7233	12.5150
	SD	± 1.0505	±1.2820	±1.0772	±1.3254	Within	107.6281		1.4161	
Adjusted Post Test Mean		24.9014	25.1706	25.3706	27.0216	Among	54.8975	K-1=3 N-K=75	18.2991	150.0107
						Within	9.1489		0.1219	

*significant at 0.05 level of confidence $F_{0.05}$ (3, 76) = 2.72, Number of Subjects (N) = 80

The results clearly point out that different types of training have significant effect on Body Mass Index.

Table 2: Analysis of Critical Difference of Body Mass Index on Adjusted mean

WTG	ATG	GCTG	CG	Mean difference	Critical difference at 5% level
24.9014	25.1706	-	-	0.2692*	0.2186
24.9014	-	25.3706	-	0.4692*	
24.9014	-	-	27.0216	2.1202*	
-	25.1706	25.3706	-	0.2 NS	
-	25.1706	-	27.0216	1.851*	
-	-	25.3706	27.0216	1.651*	

*-The Mean Difference is Significant at the 0.05 Level, NS- Not Significant

Table 2: reflects that mean difference between aerobics training group and control group has showed higher significant result than any other groups.

Table 3: Analysis of covariance on Waist Hip Ratio

Test		WTG	ATG	GCTG	CG	Source of Variance	Sum of Square	Degree of Freedom	Mean Square	F Ratio
Pre Test	Mean	0.885	0.9045	0.889	0.89	Among	0.00436	(K-!)=3 (N-K)=76	0.00145	1.8401
	SD	± 0.0254	± 0.0361	± 0.0322	± 0.0341	Within	0.06007		0.00079	
Post Test	Mean	0.8665	0.8875	0.876	0.89	Among	0.00709		0.00236	2.3574

	SD	± 0.0285	±0.0372	±0.0254	±0.0352	Within	0.07619		0.001002	
Adjusted Post Test Mean		0.8635	0.8926	0.8747	0.8844	Among	0.01037	(K-1)=3	0.00345	2.9977
						Within	0.08651	(N-K)=75	0.00115	

*significant at 0.05 level of confidence $F_{0.05}$ (3, 76) = 2.72, Number of Subjects (N) = 80

The results clearly point out that different types of training have significant effect on waist to hip ratio

Table 4: Analysis of Critical Difference of Waist to Hip Ratio on Adjusted mean

WTG	ATG	GCTG	CG	Mean difference	Critical difference at 5% level
0.8635	0.8926	-	-	0.0291*	0.01981
0.8635	-	0.8747		0.0112NS	
0.8635	-	-	0.8844	0.0209*	
-	0.8926	0.8747	-	0.0179NS	
-	0.8926	-	0.8844	0.0082NS	
-	-	0.8747	0.8844	0.0097NS	

*-The Mean Difference is Significant at the 0.05 Level, NS- Not Significant

It was evident from the Table no-4 reflects that mean difference between weight training group and control group has showed higher significant result than any other groups.

Discussion of Findings

Body mass index of overweight girls on different training group significantly improved while comparing with control group data. It also reflects that weight Training Group has showed higher significant result. Similar findings were also supported by Şavkin R and Aslan UB. 2017 [10]; Rinsa Raj and Dr. D Sultana, -2017 [8], Deo HH *et al*., 2004 [2], Nowak DK *et al.* 2015 [5], Willis *et al*., 2012 [11], Arslan, 2011 [1]. It indicated that if systematic training is applied, the level of Body mass Index also improves. Training for 12 weeks significantly decreased body weight, % body fat, and BMI over time and showed relative effect between groups. (Ji-Woon Kim *et al*., 2018) [3]. (Nindi *et al*. 2000) [4] reported that aerobic dance group had better weight loss, decrease in body mass index and body fat percentage when compared to control group. Different types of training showed statistically significant influence on the waist hip ratio of overweight college girl students when the data is compared with control group. Similar findings were also corroborated with studies of Micallef, Lebo Joyce, *et al*. 2014, S. Fenkci, A *et al*., 2006 [9], Nuri Topsakal *et al* 2019 [6]. It was expected that weight reduction would proportionally reduce the general measurements, maintaining the WHR value (Pare A *et al*., 2001) [7]. However, in a study performed by (Wabitsch *et al*. 1994), young overweight women with abdominal obesity and gluteus obesity had a greater reduction in WHR, weight. This may have been due to the fact that the levels of the variables analyzed were higher in women with abdominal obesity, favouring a greater loss. In another study, overweight women with abdominal obesity were found to oxidize more fat during aerobic physical activity, favouring a reduction in WHR (Van Aggel-Leijssen DP *et al*., 2001). The difference observed in the studies may be owing to the modes of training, duration and types of exercises adopted. At the end of the weight training exercise program, mean waist to hip girth ratio demonstrated a significant change from the weight training group and aerobic training groups. According to (Wilmore and Costill, 2004) [12] substantial reductions of the abdominal girth can result from localized exercise.

Conclusion

From the obtained results, it was concluded that the weight training, aerobics and graded circuit training are found to be effective for body mass index (BMI) and waist to hip (WHR) ratio of overweight college girl students.

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