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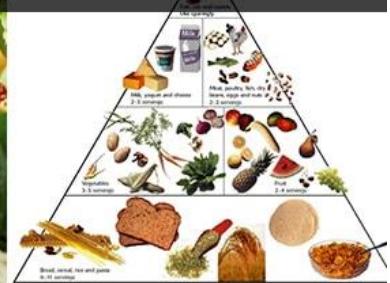
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Effects of weight training aerobics and graded circuit training on flexibility and agility of overweight students

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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 Flexibility and Agility using Modified Sit and Reach test and SEMO Agility test (12x19ft). They were statistically analysed by using the analysis of Covariance ($p<0.05$) 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

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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. A person's weight and muscular structure can typically enhance or impede Flexibility additionally, but not primarily for reasons directly related to body size. Overweight people are not less versatile than people who are of normal weight, unless they fail to use their body's full vary of motion. Really overweight people would possibly move often as a result of its uncomfortable or they are out of kind. Agility is the ability to change the direction of the body in a very quickly and effective manner. Body weight of a person definitely determines the agility of the individual.

The statement of the problem

The researcher was interested to assess the Effects of Weight Training Aerobics and Graded Circuit Training on Flexibility and Agility of Overweight 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, Graded Circuit Training Group 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 at 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 Flexibility and Agility using Modified Sit and Reach test and SEMO Agility test (12x19ft). They were statistically analysed by using the analysis of Co-variance (ANCOVA) to determine the effects and differences among the Groups on Flexibility and Agility. 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 Flexibility

Test	WTG	ATG	GCTG	CG	Source of Variance	Sum of Square	df	Mean Square	F Ratio
Pre-Test	Mean (Inch)	16.725	16.7375	14.7375	Among	70.0687	(K-1) = 3	23.3562	2.0237
	SD	± 3.1392	± 4.6264	± 2.336		877.1072		11.5408	
Post-Test	Mean (Inch)	19.200	18.325	17.625	Among	301.7210	(N-K) = 76	100.5736	10.6954
	SD	± 2.7164	± 3.9278	± 2.8091		714.6618		9.4034	
Adjusted Post Test Mean (Inch)		18.6364	17.7538	18.2722	Among	203.9390	(K-1) = 3	67.9796	13.1018
						389.1411		5.1885	

*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 Flexibility.

Table 2: Analysis of Critical Difference of Flexibility on Adjusted mean

WTG	ADG	GCTG	CG	Mean Difference	Critical Difference At 5% Level
18.636	17.7538	-	-	0.8826NS	1.4262
18.6364	-	18.2722	-	0.3642NS	
18.6364	-	-	14.5473	4.0891*	
-	17.7538	18.2722	-	0.5184NS	
-	17.7538	-	14.5473	3.2065*	
-	-	18.2722	14.5473	3.7249*	

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

Table no-2 reflects that mean difference between Weight training and Control Group has showed higher significant result than any other groups.

Table 3: Analysis of Covariance on Agility

Test	WTG	ADG	GCTG	CG	Source of Variance	Sum of Square	df	Mean Square	F Ratio
Pre Test	Mean(cm)	13.8055	13.2355	14.066	Among	14.4664	K-1=3	4.8218	4.9876
	SD	± 0.8256	± 1.0937	± 1.0493	Within	73.4738		0.9667	
Post Test	Mean(cm)	13.1567	12.6315	12.584	Among	60.4225	N-K=76	20.1408	34.8764
	SD	± 0.6354	± 0.7434	± 0.7796	Within	43.8893		0.5774	
Adjusted Post Test Mean(cm)		13.1899	12.9331	12.4945	Among	41.6202	K-1=3	13.8734	37.7967
					Within	27.5955		0.3679	

*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 Agility.

Table 4: Analysis of Critical Difference of Agility on Adjusted mean

WTG	ADG	GCTG	CG	Mean Difference	Critical Difference AT 5% Level
13.1899	12.9331	-	-	0.2568NS	0.3797
13.1899	-	12.4945	-	0.6954*	
13.1899	-	-	14.4839	1.294*	
-	12.9331	12.4945	-	0.4386*	
-	12.9331	-	14.4839	1.5508*	
-	-	12.4945	14.4839	1.9894*	

*-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 Graded Circuit Training Group and Control Group has showed higher significant result than any other groups.

Discussion of Findings

Flexibility of overweight girls of different training groups significantly increased while comparing with control group data. It reflects that mean difference between Weight Training Group and Control Group has showed higher significant result. Similar findings were also corroborated with the studies of Fatouros IG, *et al.*, -2002 [5], Hopkins, *et al.*, -1990 [6], Smith-Ryan, *et al.*, -2016 [15], Myers, *et al.*, -2015 [13], Carlos Alexandre Fett, *et al.*, - 2009 [2]. It indicated that if systematic training is applied, the level of flexibility also increases. In overweight women, sit-and-reach test flexibility improves by 13% from 10 weeks of resistance training alone (Barbosa AR *et al.*, -2002) [1]. (Rider RA & Daly J -1991) [14] reported that specialized training in back flexibility for older adults is warranted, and that significant gains in spinal mobility can be obtained, regardless of age. (Johns RJ-1962) [8] also reported that Joint movement is related to morphological elements such as muscle and facia are responsible for ~41% of a joint's resistance to movement and weight training mediated reduction in passive tension and stiffness of these tissues translates into a greater range of motion (Corrcia MA, *et al.*, -2014) [4] or it may be due to beneficial effects of Weight Training on flexibility by increasing the length of both connective and muscle tissue, thus engendering a range of joint. (Lau C, Yu R, Woo J.- 2015) [9]. (Ji-Woon Kim *et al.*, -2018) [7] confirmed that a 12 week circuit training programme significantly improve muscle strength, muscle endurance, flexibility and cardiopulmonary fitness compared to the non exercise group. (Myers *et al.*, -2015) [13] suggested that aerobic circuit activities increased flexibility and cardio pulmonary fitness of obese women and that enhancement of flexibility may be due to a gradual increase of exercise load. Likewise, (Usha Rani. S. *et al.*, -2013 and Manjappa. P. *et al.*, -2013) [16, 11] found that aerobic exercise/dance significantly improved flexibility after 6 weeks of training. Aerobics works on a muscle through a full range of motion and increases the ability of stretching there by releasing the lactic acid that results in the release of stiffness, tension, pain and fatigue from the muscle. It leads to increase in the range of motion and lubrication in the joints (Muasya, Vincent,-2011) [12]. Agility of overweight girls on different training group significantly improved while comparing with control group data. It reflects that Graded circuit Training Group and Control Group has showed higher significant result. Similar findings were also supported by Hopkins, DR, -1990 [6]; Christou M *et al.*, -2006 [3]; Lillegard WA *et al.* -1997 [10]. It indicated that if systematic training is applied, the level of Agility also improves. Another significant finding of same tune of present study is that over weight girls had higher improvement in shuttle-run (ACSM,-

2017, Astorino, TA *et al.*, -2007). (Hopkins, DR, -1990) [6] reported that 12 weeks of low impact aerobic dance, the group improved significantly on all functional fitness components. After application of 12 weeks weight training, Girls demonstrated significant higher improvement in cardio respiratory endurance and speed/agility as compared to boys from baseline to post-test time (You Fu *et al.*, -2019) [18]. It is speculated that the observed changes in agility may properly designed aerobic dance training (Chanelle *et al.*, 2009). (Wirat Sonchan *et al.*, -2017) [17] stated in their study, eight weeks of circuit training, agility, as reflected by running times, decreased from 12.15+0.93 to 10.97+1.19 sec; the decrease was statistically significant ($p < 0.05$). Such improvement in agility was significant when compared to the score (time) of the control group. It appears that the circuit training program, designed in this study, not only increased the muscle strength, but also the agility of the subjects. (Wirat Sonchan *et al.*, 2017) [17]. Thus various types of training programmes might have been specific enough to improve agility of overweight girls.

Conclusion

From the obtained results, it was concluded that The Weight Training, Aerobics and Graded Circuit Training are found to be effective for Flexibility and Agility of overweight college girl students.

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