



COMPARATIVE STUDY OF CIRCUIT AND AEROBIC DANCE TRAINING IN NUTRITIONAL STATUS AND BODY FAT OF OVERWEIGHT URBAN SCHOOL GIRLS

Physical Education

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ABSTRACT

Centering upon the suffering from chronic energy deficiency due to overweight and high body fat is very common problem in urban school girls of our society. In present days, in this pandemic situation, a compulsion practice and system of staying inside the home and intake of more amount of food without having any physical exercise, gives the gift birth of overweight status of our children. From this point of view, the researcher intends to investigate a comparative study of circuit and aerobic dance training programmes to reduce body fat and for adopting healthy weight and BMI and also to investigate which programme is more effective. Ninety, seventh and eight standard obese girls of Kalitala girls high school (N = 45) and Mission Girls High School (N = 45) mean age (13±1) years of Bankura district of West Bengal, India were randomly selected as the subjects for the study. For experimental purpose total ninety subjects were sub-divided systematically on the basis of over-weight status into three equal groups (n = 30). The circuit training and aerobic dance programs were randomly assigned to two groups which were designated as experimental groups: Group A (Circuit Training) and Group B (Aerobic Dance) and were imparted 12 weeks of circuit training and aerobic dance training programs, respectively whereas the remaining group was designated as the control group (Group C). Result showed that greater contributory effects of aerobic dance program in developing healthy BMI of overweight school girls than that of circuit training program.

KEYWORDS

Circuit-Aerobic-Nutritional-Fat.

INTRODUCTION:

Overweight along with high body fat alarming our child health in connection with the cardio vascular diseases. Chronic energy deficiency appeared due to overweight and high body fat, which is very common in our urban school girls. In the covid situation a compulsory system of staying inside the home and in taking of more amount of fast food without having required physical work gives the obesity status of our children. From this point of view, the researcher was interested to investigate the comparative effect of circuit and aerobic dance training programmes to decrease body fat and also to investigate which one is more effective in developing healthy weight and BMI status. **Review of related literature:** Valeria Calcaterra et. al. (2013)¹ found that 12-week training program elicited a significant decrease in body mass index. Ana Cordellat et. al. (2020)² found that 16 weeks of multimodal intervention based on fun-type skill-learning physical activities and physical conditioning with challenging circuits and games, together with nutritional counselling, led to significant overall health improvement. Jeffrey W. King (2001)³ investigated the effect of exercise in reducing body weight and body fat percent of overweight women. Thompson (1959)⁴ concluded the changes in body composition, especially body fat using skinfold measurements of varsity footballers due to training.

METHOD:

Subject: Ninety seventh and eight standard obese girls of Kalitala girls high school (n=45) and Mission Girls High School (n=45) out of each seventy were randomly selected as the subjects of the study. The average age of the subjects was 13 ±1 years. The health status and medical fitness of the subjects were ascertained in order to ensure the fitness ability of the students for growing through the experimental programs of the study. For experimental purpose total ninety subjects were sub-divided systematically on the basis of over-weight status into three equal groups (n = 30 in each group). The circuit training and aerobic dance programs were randomly assigned to two groups which were designated as experimental groups (named by group A: Circuit Training and Group B: Aerobic Dance), who were imparted 12 weeks of circuit training and aerobic dance training programs, respectively. On the other hand, the remaining group was designated as the Control Group (Group C).

Variable studied: 1. BMI 2. Skinfold Measurements: Biceps, Triceps, Subscapular and Supra iliac.

Study design: Random group experimental design was adopted.

Statistical Procedure: In respect to investigate the comparative effect of circuit training and aerobic dance program on BMI and selected

Skin fold measurements (Biceps, Triceps, Subscapular and Supra iliac) of 7th and 8th grade overweight girl's students, among two experimental and one control groups subjects, the analysis of covariance statistics was used. In case of existence of significant difference in analysis of covariance results is noticed, the post hoc test was applied in order to find out the existence of significance of difference between paired adjusted final means.

Level of significance: The level of significance was set at 0.05 level of confidence.

Training programme: Circuit Training Programme: In circuit training program, the eight working stations were adopted, where following eight different types of health and skill-related physical fitness programs namely reaction ability, speed, agility, endurance, coordination, flexibility and power in eight working stations were exercised. STATION-1-Reaction time ability, STATION-2-50 yards' dash, STATION-3-Shuttle Run, STATION-4-Push ups, STATION-5-Sit-ups, STATION-6-Squat jump, STATION-7-Medium pace run with long steps STATION-8-Dons and Baithaks. Prior to the commencement of circuit training program, 6 minutes warming up program was exercised. In initial stage of circuit training program in alternate working days (Mondays, Wednesdays and Fridays) of first two weeks, the eight different exercises in different eight working stations of the circuit were carried out for the duration of eight minutes and in each working day as per following training schedule. Further, in each after two weeks, one more repetition of circuit of same duration in each circuit was enhanced till the completion of last two weeks, in regard to total twelve weeks training programs. In between per circuit, six minutes' active rest were provided, thereby in last two weeks of training program, in all total 84 minutes' duration of time was exercised, where 48 minutes' duration of time was allotted for exercise in different stations in 6 repetitions of circuit and 6 minutes' duration of time was allotted for warming up and 30 minutes' duration of times was allotted for active rest (6 minutes' active rest in between circuit).

Aerobic Training programme: Aerobic dance training program was framed consisting of 8 different types of dancing items with music involving Speed of movement action time, muscular strength cardio respiratory and muscular endurance, explosive strength, coordination exercises and flexibility movements along with suitable musical setup were adopted. Duration of each dancing items was adopted for 30 seconds with optimum intensity, which was followed by 30 second jogging program before entering in the next dancing items as active rest. Till the completion of all selected 8 dancing items the same method was adopted. Before the commencement of aerobic dance training program, the duration of 6 minutes' warmup program was

adopted. In initial stage of aerobic dance training program, (in alternate working days - Mondays, Wednesdays and Fridays) of first two weeks, the eight different dancing items were carried out one by one for the duration of eight minutes in each working day as per following training schedule. Further, in each after two weeks, one more repetition of same set of dancing items of same duration was enhanced till the completion of last two weeks, in regard to total twelve weeks training programs. In between per set of dancing program, 6 minutes' active rest was provided, thereby in last two weeks of training program, in all total 84 minutes' duration of time was exercised, where 48 minutes' duration of time was allotted to exercise 8 dancing items (1 minute time for each dancing items) per set for 6 repetitions and 6 minutes duration of time was allotted for warming up and 30 minutes duration of times was allotted for active rest (6 minutes active rest in between set).

Table-1: Circuit training program

Week	Duration of warm up	Frequency (no of sets)	Duration	Density	Total duration of work
1 and 2 weeks	6 min	1	8 min	NA	14 min
3-4 weeks	6min	2	16 min	6 min	28 min
5-6 weeks	6 min	3	24 min	12 min	42 min
7-8 weeks	6 min	4	32 min	18 min	56 min
9 -10 weeks	6 min	5	40 min	24 min	70 min
11-12 weeks	6 min	6	48 min	30 min	84 min

Table-2: Aerobic dance training program

Week	Duration of warm up	Frequency (no of sets)	Duration	Density	Total duration of work
1 and 2 weeks	6 min	1	8 min	-	14 min
3-4 weeks	6min	2	16 min	6 min	28 min
5-6 weeks	6 min	3	24 min	12 min	42 min
7-8 weeks	6 min	4	32 min	18 min	56 min
9 -10 weeks	6 min	5	40 min	24 min	70 min
11-12 weeks	6 min	6	48 min	30 min	84 min

Further, in order to find out the comparative effects of circuit training and aerobic dance training programs on BMI of overweight school girls, the analysis of covariance statistics was used.

Table-3: Analysis Of Covariance On Bmi Among Circuit Training Group, Aerobic Dance Training Group And Control Group

	Mean & Standard Error			Sum Of Square	Df	Mean Sum of Square	"F" Ratio
	Circuit training Group	Aerobic training Group	Control Group				
Pre Test	26.65 ± 0.64	26.64 ± 0.64	26.64 ± 0.64	B 0.001 W 10.719	2 87	B 0.000 W 0.123	0.004
Post Test	26.43 ± 0.71	26.35 ± 0.71	26.67 ± 0.71	B 1.632 W 12.975	2 87	B 0.816 W 0.145	5.47*
Adjusted Post Test	26.42 ± 0.02	26.36 ± 0.02	26.67 ± 0.02	B 1.610 W 1.239	2 86	B 0.805 W 0.140	55.9*

* Significant ($p < 0.05$), $F_2(87) = 3.10$, $F_2(86) = 3.10$

N = 90, B = Between group variance, W = Within group variance

The table 3 clearly indicate no significant difference in BMI among circuit training group aerobic dance training group and control group in pretest phase which clearly indicate that the random assignment of the groups was quite successful. On the other hand, the significant difference in BMI among over weight girls were noticed in post and adjusted posttest phases. The F value in posttest phases (55.9) are found to be greater than that of the required F value at 2 (87) and 2(86) $df = 3.10$ to be significant at 0.05 level of confidence.

As the significant difference in analysis of covariance statistics in BMI among circuit training groups, aerobic fitness group in post and adjusted posttest phases are found, the post hoc test in paired group means of circuit training, aerobic dance training and control group was computed.

Discussion and findings:

Table- 3 highlights no significant difference in BMI in pretest phase among circuit training, aerobic dance training and control group subjects. In this case almost the same mean values of circuit training aerobic dance training and control group subjects are noticed, such almost same mean values in pretest phase highlights that the random assignment of the groups were quite successful. In posttest and adjusted posttest phases significant difference in BMI is observed among circuit training, aerobic dance training and control group subjects. In this cases in vertical view, it is noticed that the mean values of experimental groups namely circuit training and aerobic dance training groups improved significantly from pre to posttest phases (circuit training-pre mean=26.64 and post mean= 26.67 and in aerobic dance group pre mean =26.65 and post mean= 26.35), however the control group mean remained mostly unchanged from pre to posttest phases (pre mean = 26.64, post mean = 26.67). Such result indicates the contributory effects of circuit training and aerobic dance program on BMI of overweight girls. Further, the rate of improvement of mean value in BMI of aerobic fitness group is noticed to be more significant (mean = 26.35) which highlights towards greater contributory effects of aerobic dance program in developing healthy BMI of 7th and 8th grade over weight school girls than that of circuit training program. Further in the investigation of paired mean differences in BMI, significant differences between circuit training and control group mean ($md=0.25$) as well as between aerobic dance and control group mean ($md=0.31$) are noticed. On the other hand, no significant difference in BMI between circuit training and aerobic dance group mean ($md= 0.06$) is observed. From the respective literature, it is studied that both the circuit training and aerobic dance training program are laborious in nature, hence in case of aerobic dance program almost all the major muscle of the body take part strenuously associated with music, which is seemed to be very interesting, where the mind enjoy the music a lot and concentrate on music rather than feeling pain of muscular involvement, which allow the person to remain in high activation level which effects on weight of the body in respect to dissolving of excess fat accumulation and thus the weight of the body comes down to the normal which contribute significantly to assume healthy BMI. On the other hand, the circuit training is basically based on physical involvement only, which some time noticed to be monotonous and thus the subject desire for the scope of relaxation and thus the activation level sometimes comes down. Probably because of such reason the contributory effects of aerobic dance training are noticed to be bit superior than that of the circuit training program, in assuming healthy BMI. The aforesaid findings are strongly supported by the post hoc test result where the difference of adjusted posttest means values between circuit training and control group as well as between aerobic dance and control group are noticed in comparison to the difference in mean values between circuit training and aerobic dance training groups. From such result it is assumed that the training programs are having significant effects in assuming.

Table - 4: Analysis Of Covariance Of The Means Of Biceps Skinfold Of Two Experimental And One Control Group

Mean	Circuit Training	Aerobic dance training Group	Control Group	Sum of Square	df	Mean Sum of Square	F - ratio
Pre -Test	2.64	2.72	2.68	A 0.107 W 26.19	2 87	0.052 0.30	0.17
Post -Test	2.42	2.44	2.63	A 0.82 W 20.17	2 87	0.41 0.23	1.76
Adjusted Post -Test Mean	2.43	2.42	2.64	A 0.86 W 6.03	2 86	0.43 0.07	6.13

Significant at 0.05 level of confidence.

$F = 0.05(2,87) 3.10$ A = Among Mean Variance
 $F = 0.05(2,86) 3.10$ W - Within Group Variance

Table-5: Analysis Of Covariance Of The Means Of Triceps Skinfold Of Two Experimental And One Control Group Subjects Belonging To The 7th And 8th Grade Overweight School Girls

Mean	Circuit Training	Aerobic dance training Group	Control Group	Sum of Square	df	Mean Sum of Square	F - ratio
Pre -Test Mean	5.67	5.58	5.5	A 0.417 W 86.208	2 87	0.21 0.99	0.21

Post - Test Mean	5.38	5.23	5.47	A 0.506 W 74.908	2 87	0.25 0.86	0.29
Adjusted Post - Test Mean	5.31	5.23	5.47	A 0.906 W 7.023	2 86	0.45 0.08	5.45

Significant at 0.05 level of confidence.

F=0.05(2.87) 3.10 A=Among Mean Variance

F=0.05(2.86) 3.10 W=Within Group Variance

Table – 6: Analysis Of Covariance Of The Means Of Subscapular Skinfold Of Two Experimental And One Control Group

Mean	Circuit Training	Aerobic dance training Group	Control Group	Sum of Square	df	Mean Sum of Squarer	F-ratio
Pre- Test Mean	14.17	14.73	13.64	A 17.617 W 737.108	2 87	8.81 8.47	1.04
Post -Test Mean	13.77	13.21	13.53	A 4.867 W 672.133	2 87	2.43 7.72	0.31
Adjusted Post-Test Mean	13.78	12.67	14.03	A 30.076 W 29.285	2 86	15.04 0.34	44.16

Significant at 0.05 level of confidence.

F=0.05(2.87) 3.10 A-Among Means Variance

F=0.05(2.86) 3.10 W-Within Group Variance

Table – 7: Analysis Of Covariance Of The Means Of Supra Iliac Skinfold Of Two Experimental And One Control Group Subjects

Mean	Circuit Training	Aerobic dance training Group	Control Group	Sum of Square	df	Mean Sum of Square	F-ratio
Pre -Test Mean	15.32	15.58	15.27	A 1.739 W 753.150	2 87	0.87 8.66	0.100
Post Test Mean	14.27	13.6	15.02	A 30.139 W 654.308	2 87	15.01 7.52	2.00
Adjusted Post -Test Means	14.33	13.4	15.12	A 43.159 W 64.784	2 86	21.56 0.74	28.64

Significant at 0.05 level of confidence.

F=0.05(2.87) 3.10 A=Among Mean Variance

F=0.05(2.86) 3.10 W-Within Group Variance

healthy BMI. Further it is also clearly noticed that the degree of improving in BMI by adopting aerobic dance program is significantly high (mean= 26.35) than that of the circuit training program (mean = 26.43) which highlights greater contributory effects of aerobic fitness program than that of circuit training program in assuming healthy BMI. Further in order to find out the comparative effects of circuit training and aerobic dance training programs on skin fold measurements (Biceps, Triceps, Subscapular and Supra iliac) of 7th and 8th grade overweight school girls, the analysis of covariance statistics was used which is presented in Table 4 to Table 7 respectively.

CONCLUSION:

The Aerobic dance training program is found to be most effective in securing and maintaining healthy BMI and Skin fold measurements levels than that of circuit training

REFERENCES:

01. Valeria Calcaterra, Daniela Larizza, Erwan Codrons, Annalisa De Silvestri, Paola Brambilla, Sebastiano Abela, Marisa Arpesella, Matteo Vandoni. "Improved metabolic and cardiorespiratory fitness during a recreational training program in obese children." *J Pediatr Endocrinol Metab*, 2013;26(3-4):271-6. doi: 10.1515/jpem-2012-0157. PMID: 23327787
02. Ana Cordellat, Beatriz Padilla, Paula Grattarola, Consolación García-Lucerga, Elena Crehú-Gaudiza, Francisco Núñez, Cecilia Martínez-Costa, Cristina Blasco-Lafarga. "Multicomponent Exercise Training Combined with Nutritional Counselling Improves Physical Function, Biochemical and Anthropometric Profiles in Obese Children: A Pilot Study." *Nutrients*, 2020 Sep 6; 12(9): 2723. doi: 10.3390/nu12092723. PMID: 32899955
03. King, Jeffrey Warren. "A Comparison of the Effect of Interval Training vs. Continuous Training on Weight loss and Body Composition in Obese pre-menopausal Women."

04. (2001). *Electronic Thesis and Dissertations. Paper 123*. <http://dc.etsu.edu/etd/123>. Thompson Clem W. "Changes in Body Fat, Estimated from Skinfold Measurements of Varsity Football Players During a Season." *Research Quarterly* 30 (March 1959): 87.