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ISOLATED AND COMBINED EFFECTS OF HATHA YOGA AND AEROBIC DANCE TRAINING ON SELECTED PHYSICAL FITNESS VARIABLES AMONG OVERWEIGHT COLLEGE WOMEN

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Abstract

The aim of the present study was to find out the isolated and combined effects of hatha yoga and aerobic dance training on selected physical fitness variables among overweight college women. To fulfill the purpose of the study, sixty college women were randomly selected from SCAD Institute of Technology, Tirupur District, Tamilnadu and their age ranged from 18 to 25 years. The selected subjects were divided into four equal groups consisting fifteen each. Experimental group - I underwent hatha yoga training (HYT), experimental group - II underwent aerobic dance training (ADT), experimental group - III underwent combination of hatha yoga and aerobic dance training (HY&ADT) for a period of 12 weeks. Group - IV acted as control group (CG), the subjects in control group were not engaged in any training programme. Cardio respiratory endurance and flexibility were selected as physical fitness variables. The collected data was statistically analysed by using analysis of covariance. The scheffe's test was used as a post hoc test to determine which of the paired mean differ significantly. The result reveals that there was a significant difference between the experimental groups and control group on selected physical fitness variables.

Key words: *Isolated, hatha yoga, aerobic dance and overweight.*

INTRODUCTION

Obesity is becoming a serious Global Public Health Issue especially in developed countries. A growing body of evidence indicates that obesity is associated with wide range of health conditions including respiratory diseases such as asthma and blood pressure. It can cause serious health problems that are indisputable. Some studies have suggested that obese people are more prone to cardiac ailments. Also obesity can affect the thorax, the diaphragm, and the abdominal muscles. And due to increased respiratory effort result in altered respiratory function, even if the lungs are normal. It can also cause hyper tonicity in the abdominal muscles, impairing the diaphragmatic activity dependent on respiratory function. Studies of obese individuals not diagnosed with other diseases have suggested that pulmonary and chest wall compliance was reduced due to fat deposition in the chest and the abdomen thereby causing decreased elasticity and reduced dispensability of extra pulmonary structures DeLorenzo, Aronow (2007), Haque, et al. (2008) & Madanmohan (2008).

Nowadays, obesity is the worrying factor due to sedentary lifestyle and bad eating habits. Dietary and lifestyle practices are directly related to obesity, the most important cause in imbalance between the energy intake and output. It is determined by measuring body weight and fat, but body mass index is one of the best methods to calculate obesity. Hagins and Moore (2007).

Yoga is a form of physical activity which may assist in achieving recommended levels of physical activity. Yoga is increasing in popularity with recent records suggest that 15 million people have practiced yoga at least once in their lifetime. Yoga may be attractive as an alternative to traditional aerobics and strength training program because it requires little space and virtually no equipment, limited or no harmful side effects and with its focus on relaxation of mind and body. It provides qualitatively different exercise experience which may be perceived as less strenuous and more pleasurable. It does not cost a money to reduce weight .There are no side effects. Weight loss is accompanied by proper conditioning of body. One can lose weight and feel better also as yoga rejuvenates the body. Yoga helps to bring the mind-body connection. Most importantly, yoga can help the person feel better, both improving the physical fitness and elevating mood. Yoga has considered all aspects of obesity like physical, emotional and mental. Regular practice of Yoga and Yoga has different effect on obesity, which is permanent in nature than other techniques for obesity reduction. Crews, (2003), Bhagat S (2004) & Calabrese, (2004).

Aerobic dance exercise is one of the most common exercise practices in the world. Presently, aerobic dance is a popular activity, performed by small groups of all ages, and is more popular among middle-aged women than men. Music with slow or fast rhythm cadences helps to control and pace the movement of selected body segments, allowing for an overall body workout. As with other forms of aerobic exercise, aerobic dance performed within a target heart rate of between 60% and 70% of the maximal heart rate has demonstrated cardiovascular and metabolic benefits such as increased maximal oxygen consumption, improved aerobic endurance capacity and increased energy production via the mitochondrial respiration system. To aim of the present study was isolated and combined

effects of hatha yoga and aerobic dance training on selected physical fitness variables among overweight college women.

MATERIALS AND METHODS

The aim of the present study was to find out the isolated and combined effects of hatha yoga and aerobic dance training on selected physical fitness variables among overweight college women. To fulfill the purpose of the study, sixty college women were randomly selected from SCAD Institute of Technology, Tirupur District, Tamilnadu and their age ranged from 18 to 25 years. The selected subjects were divided into four equal groups consisting fifteen each. Experimental group - I underwent hatha yoga training (HYT), experimental group - II underwent aerobic dance training (ADT), experimental group - III underwent combination of hatha yoga and aerobic dance training (HY&ADT) for a period of 12 weeks. Group - IV acted as control group (CG), the subjects in control group were not engaged in any training programme. The following physical variables namely cardio respiratory endurance and flexibility were selected as a variables. The following standardized tests were used to measure the physical fitness variables namely, cardio respiratory endurance was measured by cooper's 12 minutes run and walk test and flexibility was measured by sit and reach test. In the present study the data were analysed in two parts. (a) in order to analysis the training effects of each group on selected physical fitness variables "t" ratio was used. (b) In order compare the effect of treatment on selected physical fitness variables among the four groups, analysis of covariance was used. Whenever, the 'F' ratio for adjusted post-test was found to be significant to determine which of the four paired means significantly differed, the Scheffe's test was applied.

RESULTS AND DISCUSSION

TABLE – I
SIGNIFICANCE OF MEAN GAINS / LOSSES BETWEEN PRE TEST AND POST TEST ON SELECTED VARIABLES OF HATHA YOGA TRAINING GROUP

S.No	Variables	Pre test Mean (±SD)	Post test Mean (±SD)	MD	SE	't' ratio
1	Cardio respiratory endurance	1195.13 (102.17)	1289.60 (136.74)	94.46	28.29	3.33*
2	Flexibility	10.87 (2.26)	16.80 (1.56)	5.93	0.49	12.05*

An examination of table – I indicates that the obtained 't' ratio are 3.33 and 12.05 for cardio respiratory endurance and flexibility respectively. The obtained 't' ratio on the selected variables are found to be greater than the required table value of 2.04 at 0.05 level of significance for 29 degrees of freedom. So it is found to be significant.

TABLE – II

SIGNIFICANCE OF MEAN GAINS / LOSSES BETWEEN PRE TEST AND POST TEST ON SELECTED VARIABLES OF AEROBIC DANCE TRAINING GROUP

S.No	Variables	Pre test Mean (±SD)	Post test Mean (±SD)	MD	SE	't' ratio
1	Cardio respiratory endurance	1184.46 (115.54)	1353.93 (154.21)	169.46	41.32	4.10*
2	Flexibility	11.46 (1.40)	16.86 (2.47)	5.40	0.66	8.08*

An examination of table – II indicates that the obtained 't' ratio are 4.10 and 8.08 for cardio respiratory endurance and flexibility respectively. The obtained 't' ratio on the selected variables are found to be greater than the required table value of 2.04 at 0.05 level of significance for 29 degrees of freedom. So it is found to be significant.

TABLE – III

SIGNIFICANCE OF MEAN GAINS / LOSSES BETWEEN PRE TEST AND POST TEST ON SELECTED VARIABLES OF COMBINATION TRAINING GROUP

S.No	Variables	Pre test Mean (±SD)	Post test Mean (±SD)	MD	SE	't' ratio
1	Cardio respiratory endurance	1178.93 (67.60)	1382.80 (82.25)	203.86	29.46	6.91*
2	Flexibility	11.60 (2.19)	20.73 (2.37)	9.13	0.68	13.38*

An examination of table – III indicates that the obtained 't' ratio are 6.91 and 13.38 for cardio respiratory endurance and flexibility respectively. The obtained 't' ratio on the selected variables are found to be greater than the required table value of 2.04 at 0.05 level of significance for 29 degrees of freedom. So it is found to be significant.

TABLE – IV

SIGNIFICANCE OF MEAN GAINS / LOSSES BETWEEN PRE TEST AND POST TEST ON SELECTED VARIABLES OF CONTROL GROUP

S.No	Variables	Pre test Mean (±SD)	Post test Mean (±SD)	MD	SE	't' ratio
1	Cardio respiratory endurance	1198.33 (128.84)	1254.26 (112.91)	55.33	30.71	1.80
2	Flexibility	11.86 (2.32)	12.00 (2.42)	0.13	0.25	0.52

An examination of table – IV indicates that the obtained 't' ratio are 1.80 and 0.52 for cardio respiratory endurance and flexibility respectively. The obtained 't' ratio on the selected variables are found to be lesser than the required table value of 2.04 at 0.05 level of significance for 29 degrees of freedom. So it is found to be insignificant.

TABLE – V
ANALYSIS OF COVARIANCE FOR THE PRE TEST, POST TEST AND ADJUSTED POST TEST MEANS ON CARDIO RESPIRATORY ENDURANCE OF EXPERIMENTAL AND CONTROL GROUPS

Test	Experimental Group-'A' (Meter)	Experimental Group-'B' (Meter)	Experimental Group-'C' (Meter)	Control Group (Meter)	Source of variance	Sum of square	df	Mean square	'F' ratio
Pretest Mean (±SD)	1195.13 (102.17)	1184.46 (115.54)	1178.93 (67.60)	1198.33 (128.84)	B.M	3864.6	3	1288.20	0.12
					W.G	629491.33	56	11240.91	
Post test Mean (±SD)	1289.60 (136.74)	1353.93 (154.21)	1382.80 (82.25)	1254.26 (112.91)	B.M	155103.78	3	51701.21	3.34*
					W.G	867953.86	56	15499.17	
Adjusted Post test Mean	1286.89	1356.23	1387.69	1249.78	B.S	177734.77	3	59244.92	4.47*
					W.S	729584.20	55	13265.17	

B.M. –Between means W.G. – Within groups B.S. – Between sets W.S. – Within sets

******Significant at 0.05 level of confidence.*

(The table values required for significance at 0.05 level of confidence for 3 & 56 and 3 & 55 are 2.76 *and* 2.77 *respectively).*

The table - V shows that the pre-test mean values on cardio respiratory endurance of hatha yoga training group, aerobic dance training group, combination training group and control group are 1195.13, 1184.46, 1178 and 1198.33 respectively. The obtained 'F' ratio 0.12 for pre-test scores is less than the table value 2.76 for df 3 and 56 required for significance at 0.05 level of confidence on cardio respiratory endurance. The post-test mean values on cardio respiratory endurance of hatha yoga training group, aerobic dance training group, combination training group and control group are 1289.60, 135393, 1382.80 and 1254.26 respectively. The obtained 'F' ratio 3.34 for post-test scores is greater than the table value 2.77 for df 3 and 56 required for significance at 0.05 level of confidence on cardio respiratory endurance. The adjusted post-test means of hatha yoga training group, aerobic dance training group, combination training group and control group are 1286.89, 1356.23, 1387.69 and 1249.78 respectively. The obtained 'F' ratio of 4.47 for adjusted post-test means is greater than the table value of 2.77 for df 3 and 55 required for significance at 0.05 level of confidence on cardio respiratory endurance. The results of the study indicated that there is a significant difference among the adjusted post-test means of hatha yoga training group, aerobic dance training group, combination training group and control group on cardio respiratory endurance. Since the obtained 'F' ratio value is significant, further to find out the paired mean difference, the Scheffe's test was employed and is presented in table – VI.

TABLE – VI

SCHEFFE'S TEST FOR THE DIFFERENCE BETWEEN PAIRED MEANS ON CARDIO RESPIRATORY ENDURANCE

Experimental Group-'A' ***(Hatha yoga training group)***	**Experimental Group-'B'** ***(Aerobic dance training group)***	**Experimental Group-'B'** ***(Combination training group)***	**Control Group**	**Mean Difference**	**Required C.I**
1286.89	1356.23	--	--	69.34	121.24
1286.89	--	1387.69	--	100.8	
1286.89	--	--	1249.78	37.11	
--	1356.23	1387.69	--	31.46	
--	1356.23	--	1249.78	106.45	
--	--	1387.69	1249.78	137.91*	

****Significant at 0.05 level of confidence.***

Table – 9 shows that the mean difference values between hatha yoga training group and aerobic dance training group; hatha yoga training group and combination training group; hatha yoga training and control group; aerobic dance training group and combination training group; aerobic dance training group and control group and between combined group and control group are 69.34, 100.8, 37.11, 31.46, 106.45 and 137.91 respectively. It may be concluded from the results that there is a significant difference between adjusted post means among experimental group namely combination training group and control group. The results of the study show that there is a significant difference between combined group and control on cardio respiratory endurance. The pre test, post test and adjusted post test means values of hatha yoga, aerobic dance, combined and control groups on cardio respiratory endurance are graphically represented in the Figure – I.

FIGURE – I

BAR DIAGRAM SHOWING THE MEAN VALUES OF PRE TEST, POST TEST AND ADJUSTED POST TEST OF HATHA YOGA, AEROBIC DANCE, COMBINED AND CONTROL GROUPS ON CARDIO RESPIRATORY ENDURANCE

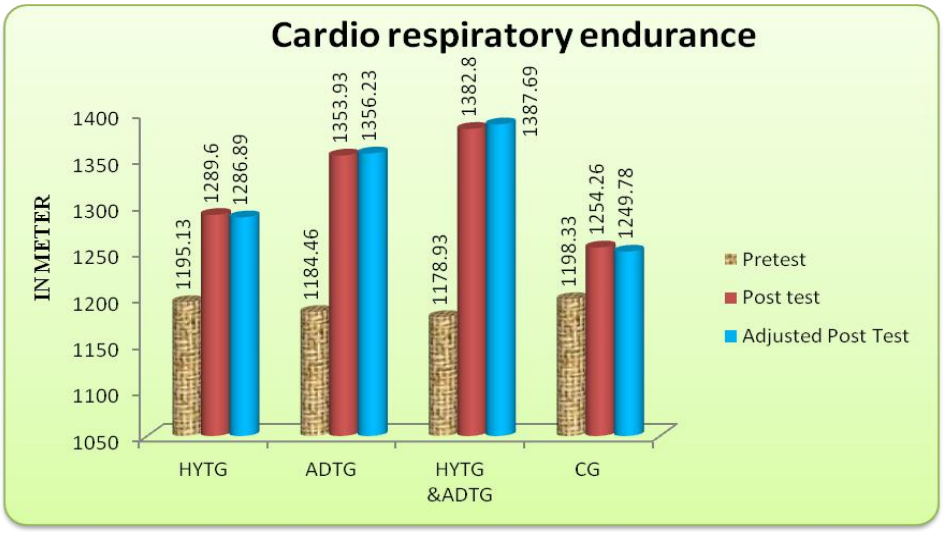


TABLE – VII

ANALYSIS OF COVARIANCE FOR THE PRE TEST, POST TEST AND ADJUSTED POST TEST MEANS ON FLEXIBILITY OF EXPERIMENTAL AND CONTROL GROUPS

Test	Experimental Group-'A' (Centimeter)	Experimental Group-'B' (Centimeter)	Experimental Group-'C' (Centimeter)	Control Group (Centimeter)	Source of variance	Sum of square	df	Mean square	'F' ratio
Pretest Mean (±SD)	10.87 (2.26)	11.46 (1.40)	11.60 (2.19)	11.86 (2.32)	B.M	8.050	3	2.68	0.62
					W.G	242.80	56	4.33	
Post test Mean (±SD)	16.80 (1.56)	16.86 (2.47)	20.73 (2.37)	12.00 (2.42)	B.M	577.73	3	192.57	38.29*
					W.G	281.60	56	5.029	
Adjusted Post test Mean	17.39	16.86	20.65	11.77	B.S	603.08	3	201.03	53.38*
					W.S	207.13	55	3.77	

B.M. –Between means W.G. – Within groups B.S. – Between sets W.S. – Within sets

*****Significant at 0.05 level of confidence.*

(The table values required for significance at 0.05 level of confidence for 3 & 56 and 3 & 55 are 2.76 and 2.77 respectively).

The table - VII shows that the pre-test mean values on flexibility of hatha yoga training group, aerobic dance training group, combination training group and control group are 10.87, 11.46, 11.60 and 11.86 respectively. The obtained 'F' ratio 0.62 for pre-test scores is less than the table value 2.76 for df 3 and 56 required for significance at 0.05 level of confidence on flexibility. The post-test mean values on flexibility of hatha yoga training group, aerobic dance training group, combination training group and control group are 16.80, 16.86, 20.73 and 12.00 respectively. The obtained 'F' ratio 38.29 for post-test scores is

greater than the table value 2.77 for df 3 and 56 required for significance at 0.05 level of confidence on flexibility. The adjusted post-test means of hatha yoga training group, aerobic dance training group, combination training group and control group are 17.39, 16.86, 20.65 and 11.77 respectively. The obtained 'F' ratio of 53.38 for adjusted post-test means is greater than the table value of 2.77 for df 3 and 55 required for significance at 0.05 level of confidence on flexibility. The results of the study indicated that there is a significant difference among the adjusted post-test means of hatha yoga training group, aerobic dance training group, combination training group and control group on flexibility. Since the obtained 'F' ratio value is significant, further to find out the paired mean difference, the Scheffe's test was employed and is presented in table – VIII.

TABLE – VIII
SCHEFFE'S TEST FOR THE DIFFERENCE BETWEEN PAIRED MEANS ON FLEXIBILITY

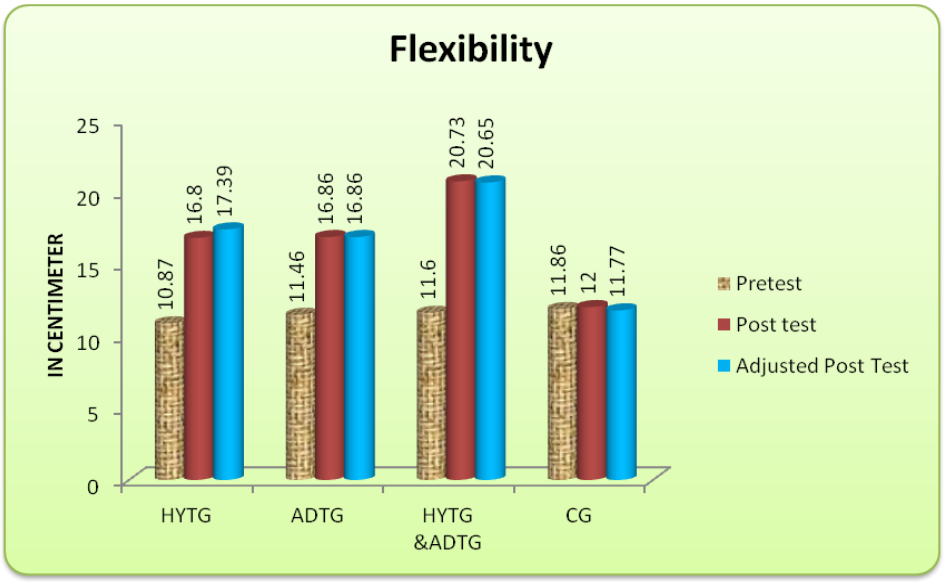
Experimental Group-'A' *(Hatha yoga training group)*	Experimental Group-'B' *(Aerobic dance training group)*	Experimental Group-'B' *(Combination training group)*	Control Group	Mean Difference	Required C.I
17.39	16.86	--	--	0.53	2.04
17.39	--	20.65	--	3.26*	
17.39	--	--	11.77	5.62*	
--	16.86	20.65	--	3.79*	
--	16.86		11.77	5.09*	
--		20.65	11.77	8.88*	

Significant at 0.05 level of confidence.

Table – VIII shows that the mean difference values between hatha yoga training group and aerobic dance training group; hatha yoga training group and combination training group; hatha yoga training and control group; aerobic dance training group and combination training group; aerobic dance training group and control group and between combined group and control group are 0.53, 3.26, 5.62, 3.79, 5.09 and 8.88 respectively. When the control group is compared with experimental groups, the mean differences are 3.26, 5.62, 3.79, 5.09 and 8.88 which are significant at 0.05 level of confidence. Hence, there is significant difference between control and experimental groups in flexibility among obese women. However, the mean difference between the two experimental groups was 0.53 which is not significant at 0.05 level of confidence. It may be concluded from the results that there is a significant difference between adjusted post means among experimental group and control group. The results of the study show that there is a significant difference between experimental groups and control on flexibility. The pre test, post test and adjusted post test means values of hatha yoga, aerobic dance, combined and control groups on flexibility are graphically represented in the Figure – II.

FIGURE – II

BAR DIAGRAM SHOWING THE MEAN VALUES OF PRE TEST, POST TEST AND ADJUSTED POST TEST OF HATHA YOGA, AEROBIC DANCE, COMBINED AND CONTROL GROUPS ON FLEXIBILITY



FINDINGS AND CONCLUSIONS

Cardio Respiratory Endurance: The results of the study reveal that there is a significant difference in the cardio respiratory endurance of hatha yoga, aerobic dance training group, combination training group and control group between the pre-test and post-test. But there is no significant difference in the flexibility of control group between pre-test and post-test. This improvement of cardio respiratory endurance may be the influence of hatha yoga training, aerobic dance training and combination of training. Regarding statistical analysis, it is observed that there is a significant differences on the cardio respiratory endurance between the adjusted post test means of experimental 'A', experimental 'B', experimental 'C' and control group and also a significant difference is found between the experimental groups and control group.

It is concluded that the combination of training group is found to be better than other experimental group and control group. The results indicate that the improvement in cardio respiratory endurance performance is due to the impact of combination of hatha yoga and aerobic dance training programme. The results agree with the studies done by Nisha Shinde, Shinde, Khatri and Deepali Hande (2013) The findings of the study is in par with the literatures that a relatively yoga and aerobic training significantly improve the physical fitness components.

Flexibility: The results of the study reveal that there is a significant difference in the flexibility of hatha yoga training, aerobic dance training and combination training group between the pre test and post test. But there is no significant difference in the flexibility of control group between pre-test and post-test. Regarding statistical analysis, it is observed that there is a significant differences on the flexibility between the adjusted post test means of experimental 'A', experimental 'B', experimental 'C' and control group and also a significant difference is found between the experimental groups and control group.

It is concluded that the combination of training group is found to be better than other experimental group and control group. The results indicate that the improvement in flexibility performance is due to the impact of combination of hatha yoga and aerobic dance training programme. The results agree with the studies done by **Bal and Kaur (2009)** The findings of the study is in par with the literatures that a relatively hatha yoga training significantly improve the physical fitness components namely flexibility.

From the analysis of the data, the following conclusions are drawn,

1. The hatha yoga training and aerobic dance and combined hatha yoga and aerobic dance training group had shown significant improvement in all the selected physical fitness variables of overweight women.
2. The control group had not shown significant changes in all the selected physical variables of overweight women.
3. The results of the study showed that there is a significant difference among the adjusted post test means of the experimental groups in the selected physical fitness variable.
4. The result of the study showed that aerobic dance training group is better than the hatha yoga training group and control group in physical fitness variables namely cardio respiratory endurance.
5. The result of the study showed that individualized hatha yoga training group is better than the aerobic dance training group and control group in physical fitness variables namely flexibility. The results indicate that the improvement in physical fitness variables is due to the impact of hatha yoga training programme.

6. The result of the study showed that combination of hatha yoga and aerobic dance training group is better than the individualized group.

RECOMMENDATIONS

1. The results of this study clearly indicate that isolated and combined effects of hatha yoga and aerobic dance training programme can enhance the performance of selected physical variables among over weight college women.
2. Hence, it is recommended that director of physical education and physical educators in the field of physical education should include hatha yoga training, aerobic dance training and combined training programme may be include their schedules.
3. It is suggested that similar type of hatha yoga training, aerobic dance training and combined training programme may be include the physical education syllabus.
4. A similar study may be conducted on normal people to assess their level in the selected variables.
5. A similar study may be conducted on different games and sports.
6. A similar study may be conducted in greater detail to assess changes on hematological and biochemical variables.
7. Similar types of studies can be undertaken for different age groups and also for overweight men.

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