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Effect of aerobic training and hatha yoga on vital capacity of college female students

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Abstract
The veracity of modern medical science is based on controlled clinical trials. Vital capacity is a product of the interaction of a biological organism with the social environment. It is the way an individual adjusts with his external environment, and responding to the environment. The purpose of the study was to investigate the effect of Aerobic training, Hatha yoga, and combination of aerobic training and hatha yoga on Vital capacity of college level female students.
Method: Subjects were divided into four equal groups on random basis (Groups A, B, C &D) consisting of 25 subjects in each group. Three out of the four groups were given experimental treatments i.e. aerobic training (Group- A), Hatha yoga (Group- B) and combination of aerobic training and hatha yoga (Group-C) and while the remaining one group (Group- D) was designated as control group.
Results: Aerobic training, hatha yoga and combination of aerobic and hatha yoga is found to be more significant difference in Vital capacity of college female students.
Conclusion: The aerobic training is found to be more effective in changing the Vital capacity in comparison to the effect of hatha yoga training and combination of hatha yoga and aerobic training on aforesaid Vital capacity.

Keywords: Aerobic training, Hatha Yoga, Vital Capacity, college female students

1. Introduction
The cell is considered to be the basic unit of organism; it is the set of life; it is the basis of life as well. It, like other organism, breathes, eats and eliminates waste products. When cells gain strength and power, we say, they have become efficient. The efficiency of the cell can only increase when it gets abundant supply of oxygen and food. This supply is made available to the cell by the 'transpiration system' (circulatory system). The central organ involved in blood supply is heart, which is made of a special muscle. During exercise there is more demand for oxygen and food by the cells. In fact, the cells are the storerooms for energy. Thus the circulatory and the respiratory systems are brought into full operation. The law of use and disuse indicates that the organs can only develop efficiency when a greater demand is made on them. Only then, they will make supreme effort. Thus the heart and the blood vessels become capable of doing more work. The stroke volume of the heart is increased, while the rate of beating slows down so that the trained heart has more rest than the untrained one. In the same way, the respiratory system adopts itself to the situations making greater demand of oxygen on it. Regular training could also listen the physical stresses of daily life through an increase in the reserves of strength and power and a diminution in the dead weight fat.
Indians had adopted Yoga as a life-style since the beginning of civilization. Mind is the king of the senses. One who her conquered her mind, senses, passions, through and reason, is a king among men. That female is fit for hatha yoga, the royal union with the universal spirit. One who her conquered his mind has complete mastery of his self. The scientific nature of the Yogic practice was first revealed in 1924, when Swami Kuvalyanandaji started her scientific research in the field of Yoga. The origins of hatha yoga have been traced back to the eleventh century A.D. The Sanskrit word ha means "sun" and the means "moon" and thus hatha, or literally sun-moon yoga, strives to balance opposing parts of the physical body, the front and back, left and right, top and bottom. In addition to breathing, hatha yoga utilizes asana, or physical postures, to bring about flexibility, balance and strength in the body. Yogis claim that although hatha yoga can make the body as strong and fit as any exercise program, its real benefits come out because it is a system of maintenance and balance for the whole body.
Each of the systems in our body (cardiovascular, neuro-muscular, respiratory and other) is influenced by exercise. Each system is affected in a manner specific to the kind of exercise performed. Aerobic exercise emphasizes improvement of the metabolic, cardiovascular, respiratory, and muscular systems.
Aerobic fitness is a complex component of physical fitness. It involves the interaction of numerous physiological processes in the cardiovascular, respiratory, and muscular system. Thus, the combined cardiovascular and respiratory system is the oxygen supply mechanism for the muscles. If we are committed aerobic exercise in combination with a sensible diet it can help to provide an overall sense of well-being and it can even help to prevent chronic illness, disability and premature death. There are also many benefits of aerobic training like performance enhancement. Body composition changes, body heat transfer system improvement, vital capacity, personality development, avoid stress and anxiety etc.

Thereby a humble attempt was taken in this study to investigate the effect of Aerobic training and Hatha yoga furthermore the combination of aerobic training and hatha yoga on Vital capacity of college level female students.

2. Materials & Method

2.1 Selection of variables

One hundred female students of Krishnanagar Women's College, Dist.: Nadia, West Bengal, were randomly selected as the subjects for this study with an age range of 18 to 19 years.

The subjects were participated voluntarily in the programme after examined by the physician to ascertain that they were free from any type of medical problems and were fit enough to go through Aerobic training, Hatha yoga training and combination of Aerobic and Hatha yoga training programmes for ten weeks. Subjects were divided into four equal groups on random basis (Groups A, B, C & D) consisting of 25 subjects in each group. Three out of the four groups were given experimental treatments i.e. Aerobic training (Group- A), Hatha yoga (Group- B) and combination of hatha yoga and aerobic training (Group-C) and while the remaining one group (Group- D) was designated as control group, which were not given any experimental treatment. The Vital capacity scores were obtained by using (wet spirometer), from the subjects of all the groups.

2.2 Administration of Tests

The spirometer was equipped with a good length of a rubber hose (35 to 42 inches). The spirometer was fitted with water within one inch of the top and was placed at a height where by all subjects can stand erect at the beginning of the test. The mouth piece was disinfected by an antiseptic solution after use by each subject.

The subject was asked to take a deep breath before the test, then after the fullest possible inhalation the subject exhaled slowly and steadily bending forward over the hose, fill all the air within his control was expelled. Care was taken to prevent air from escaping either through the nose or around the edges of the mouth piece and was also ensured that a second breath was not taken by the subject during the test. In case of doubt this test was repeated.

2.3 Scoring of vital capacity

The score was recorded in litters as indicated by the scale attached with the wet spyrometer.

2.4 Administration of training programme

A ten weeks aerobic training, hatha yoga training and combination aerobic training and Hatha yoga programme for three days in a week i.e., on Monday, Wednesday & Friday were conducted. The training programme was administered in the morning session of the day. The control group was continued their regular programme as usual.

2.5 Statistical Procedure

In order to investigate the comparative effect of each training method i.e. Aerobic training, Hatha yoga training, and. combination of aerobic training and Hatha yoga, on physical fitness among three experimental groups and one control group of the college female students undertaken on this study, the analysis of co-variance statistics was applied.

In case of existence of significant, the post-hoc test was applied in order to investigate the existence significant differences if any, among three experimental groups namely aerobic training, hatha yoga training and combination of aerobic training and Hatha yoga and one control group of college female students.

The significant level was set at 0.05 level of confidence.

3. Results

The results were given in the following tables & figures.

Table 1: Analysis of co-variance of the means of vital capacity among three experimental groupsand one control group

Mean	Aerobic Group (A)	Hath yoga Group (B)	Combination of Aerobic & Hath yoga group (C)	Control group (D)	Sum of square		d.f	Mean sum of square	F-ratio
Pre test	3.86	3.77	3.87	3.84	A	0.155	3	0.051	0.15
					W	32.898	96	0.342	
Post test	4.26	3.96	4.11	3.81	A	2.798	3	0.932	3.03*
					W	29.498	96	0.307	
Adjusted post test	4.24	3.97	4.09	3.80	A	2.604	3	0.868	3.16*
					W	26.06	95	0.274	

*Significant at 0.05 level F.05 (3, 96) =2.72 F.05 (3, 95) =2.71

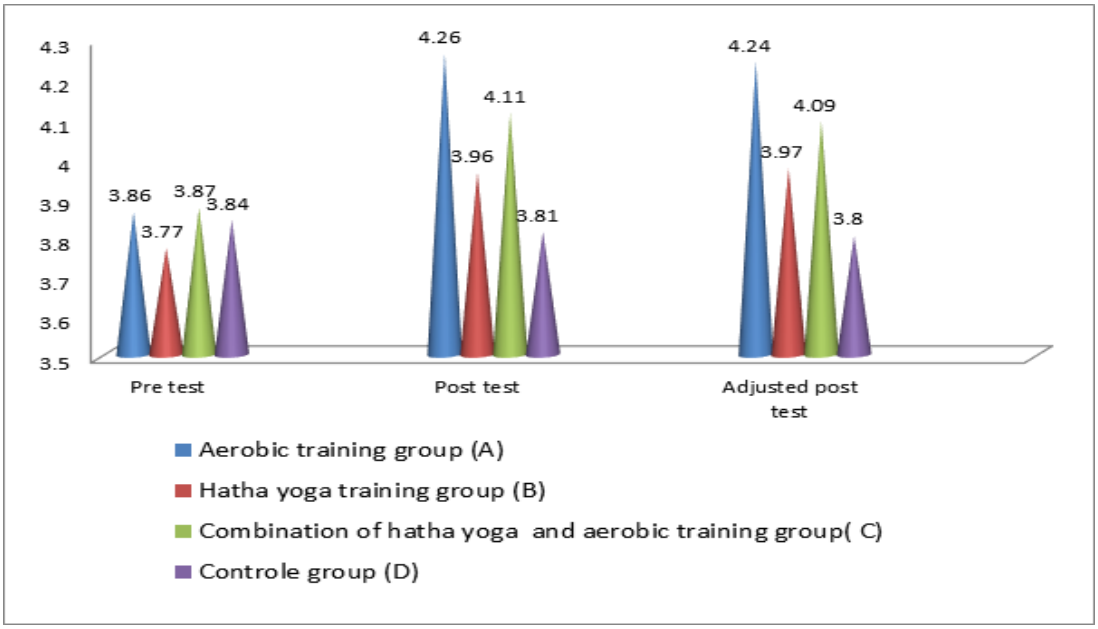

Fig 1: Comparison of vital capacity among, aerobic training (a), hatha yoga training (b), combination of aerobic training and hatha yoga groups (c) and one control group (d) in pre, post and adjusted post test means

Table 1 and Figure 1, revealed no significant difference in vital capacity in pretest phase among three experimental training groups (aerobic training, hatha yoga, combination of aerobic training and hatha yoga groups) and one control group. The obtained 'F' value 0.005 was found to be lesser than required 'F' value 2.72 to be significant at 0.05 level of confidence with 3, 96 degree of freedom.

However, the 'F' ratio values in posttest (3.03), and adjusted post-test phases (3.16) were found to be significant for being greater than the required 'F' value 2.72 and 2.71 to be significant at 0.05 level of confidence with 3, 96 and 3, 95 degree of freedom respectively.

As in analysis of co-variance the significant difference in vital capacity in adjusted post-test means among aerobic training, hatha yoga training, combination of hatha yoga and aerobic training and one control group was found, further in order to find out the existence of significant difference between paired adjusted final means, the post-hoc test was computed, which is presented in table- 2.

Table 2: Paired adjusted final means and difference between means of four different groups related to vital capacity

Aerobic Group (A)	Hath yoga Group (B)	Combination of Aerobic & Hath yoga group (C)	Control Group (D)	Mean difference	Critical difference
4.24	3.97			0.26*	0.20
4.24		4.09		0.14	0.20
4.24			3.80	0.44*	0.20
	3.97	4.09		0.12	0.20
	3.97		3.80	0.17	0.20
		4.09	3.80	0.29*	0.20

*Significant at 0.05 level of confidence.

In Table 2, (post-hoc test) it was also observed that there were significant differences between each training groups and control group in which the mean value of training groups were found to be greater and than that of control group mean values.

The concerned literature highlights that the training group were able to perform exercise much more efficiently. This results mainly from the body more effectively getting oxygen into the blood stream and transporting it to the working muscles, where it is needed for the metabolic processing of energy. In other words, the regular exerciser's body is much more proficient at loading, transporting and utilizing oxygen.

Probably due to such reasons it may be assumed that aerobic training, hatha yoga training, and combination of aerobic training and hatha yoga were having more significant effect on vital capacity of experimental group and thus the significant increased in mean values of training groups from pre to the post-test phase were observed, on the other hand no change of mean values of control group from pre to post test phase was noticed.

The study is in consonance with the findings of Chlocking.

4. Conclusion

Further in respect to the development of vital capacity, the role of aerobic training programme was found to be more effective in comparison to the effect of hatha yoga and combination of aerobic training and hatha yoga programmes in improving the vital capacity ability undertaken in this study.

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