RELATIVE EFFECT OF AEROBIC TRAINING WITH AND WITHOUT PRANAYAMA PRACTICES ON MAXIMUM OXYGEN CONSUMPTION AMONG ACTIVE AND SEDENTARY COLLEGE MEN

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ABSTRACT

The purpose of the present study was to analyze the effect of aerobic training with and without pranayama practices on maximum oxygen consumption among active and sedentary college men. The study was confined to sixty college men from Veterinary College, Hassan, Karnataka state, India as subject and their age ranged from 18 to 23 years. Of the chosen sixty college men, thirty subjects were active and remaining thirty subjects were sedentary. Of the thirty active subjects 15 were performed aerobic training with pranayama practices the remaining 15 subjects were performed aerobic training only. Similarly, of the thirty chosen sedentary subjects 15 were performed aerobic training with pranayama practices the remaining 15 sedentary subjects were performed aerobic training only. The training regimen for the experimental groups lasted for twelve weeks for six days per week. The data collected from the training groups on maximum oxygen consumption was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test. Further, percentage of changes was calculated. To find out the chances in maximum oxygen consumption due to the impact of experimental treatment. Further, three-way analysis of variance ($2 \times 2 \times 2$) was used to find out the influence of each factor independently and also their combined influence. Subsequent to 12 weeks of aerobic training with prenayama (ATP) and aerobic training (AT) 14.50% and 13.59% of changes in VO_2 Max was observed among active men subjects. Similarly, after 12 weeks of aerobic training with prenayama (ATP) and aerobic training (AT) 10.98% and 8.23% of changes in VO_2 Max was observed among sedentary men subjects.

Key words: *Aerobic training, Pranayama practices, Maximum oxygen consumption, Active and Sedentary college men.*

INTRODUCTION

Sedentary and inactive people should be given opportunities to become physically active, and those who are minimally active should be supported in doing more. For some people, it may be difficult to find time for sports or regular visits to the gym. However, making small changes to daily routines can help these individuals reach the recommended amount of physical activity. Although all forms of physical activity provide some benefits, aerobic exercise is particularly effective because it causes the heart and lungs to work harder than usual. National physical activity guidelines recommend at least 150 minutes of moderate intensity or 75 minutes of high

intensity aerobic activity every week. Aerobic exercise provides a wide range of benefits for the body and brain.

The aerobic training holds a very conspicuous place in the field of training methods, because it is one of the most powerful methods that ensure and improve the health, endurance and so on. The objective of aerobic training is to develop the energy production system(s) to meet the demands of the event. For continuous exercise, ATP must be re-synthesised at the same rate as it is utilized. Aerobic training has been proved to be best training for endurance, especially so-called "interval-training" has been the subject of many pedagogic and medical paper. A sound basis of aerobic endurance is fundamental for all events.

Aerobic training consists of performing low-to medium-intensity exercise for long periods of time. Such as jogging or running several miles or kilometers to hundreds of miles; cycling dozens of miles to thousands of miles; swimming hundreds of yards or meters to dozens of miles or kilometer. Athletes are trained for endurance to compete in 5 kilometer and 10 kilometer races, marathons, ultra marathons, triathlons, Century bike rides, mountain biking and so on. Non-athletes can be trained similarly with an aerobic workout to burn calories and fat. Regular exercise results in an increase in the blood flow and improves oxygen carrying and waste removal capacity and further increases work load capacity (Vitale, 1973). Exercise increases the volume of hemoglobin and erythrocyte of the blood. Also blood vessels are seen to maintain elasticity and suppleness when stressed systematically probably by the beneficial effect of the heart.

Pranayama is an exact science. It is the regulation of breath or control of prana which is the stoppage of inhalation and exhalation, that follows after securing that steadiness of posture or seat, Asana. As the Bible states, "Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living being." Pranayama helps to connect the body to its battery, the solar plexus, where tremendous potential energy is stored. When tapped through specific techniques this vital energy, or prana, is released for physical, mental and spiritual rejuvenation. Regular practice removes obstructions, which impede the flow of vital energy. When the cells work in unison, they bring back harmony and health to the system. 20 to 25 minutes of pranayama practice increases lung capacity, breathing efficiency, circulation, cardiovascular efficiency, helps to normalize blood pressure, strengthens and tones the nervous system, combats anxiety and depression, improves sleep, digestion and excretory functions,

provides massage to the internal organs, stimulates the glands, enhances endocrine functions, normalizes body weight, provides great conditioning for weight loss, improves skin tone and complexion (Yadav & Rachna, 1998). To give more awareness of healthy living, the investigator analyzed the effect of aerobic exercises with and without pranayama practices on maximum oxygen consumption of active and sedentary college men.

Subjects and Variables

The study was confined to sixty college men from Veterinary College, Hassan, Karnataka state, India as subject for the study and their age ranged from 18 to 23 years. Of the chosen sixty college men, thirty subjects were active and remaining thirty subjects were sedentary. Of the thirty active subjects 15 were performed aerobic training with pranayama practices and the remaining 15 active subjects were performed aerobic training only. Similarly, of the thirty chosen sedentary subjects 15 were performed aerobic training with pranayama practices the remaining 15 sedentary subjects were performed aerobic training only. The maximum oxygen consumption was the chosen dependent variable and was measured by conducting Cooper's 12 minutes Run / Walk.

Training Program

The training regimen for the experimental groups lasted for twelve weeks for six days per week. Of the thirty active subjects 15 were performed aerobic training with pranayama practices the remaining 15 subjects were performed aerobic training only. Similarly, of the thirty chosen sedentary subjects 15 were performed aerobic training with pranayama practices the remaining 15 sedentary subjects were performed aerobic training only. Aerobic training with pranayama practices group (active & sedentary group) performed pranayama practices after completion of their aerobic training workout. However, aerobic training without pranayama practices group (active & sedentary group) performed aerobic workout only. The subjects of the experimental groups performed the specific training package during the morning session.

The experimental groups performed aerobic exercise alternatively six days in a week for twelve weeks. In this present investigation continuous running was given as aerobic exercise. To fix the training load for the aerobic exercise group the subjects were examined for their exercise heart rate in response to different work bouts, by performing continuous running of two minutes duration for proposed repetitions and sets, alternating with active recovery based on work-rest ratio. The subject's training zone was computed using Karvonen formula and it was fixed at

65%HRmax to 90%HRmax. The work rest ratio of 1:1 between exercises and 1:3 between sets was given.

During the training period, the experimental groups underwent pranayama practices six days a week for twelve weeks. The pranayama practices included in this training programme were Anuloma Viloma, Nadi Suddhi, Ujjai, Suryadedana, Bhastrika and Kapalabhati respectively. The training programme was conducted in the morning sessions from 6 `O`clock onwards. The training load was progressively increased once in three weeks.

Statistical Technique

The data on maximum oxygen consumption was collected from the active and sedentary men performed aerobic training with pranayama practices as well as aerobic training alone groups once at the beginning (pre-test) and finally at the end of the experimental period of 12weeks (post –test). The data collected from the training groups on maximum oxygen consumption was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test. Further, percentage of changes was calculated to find out the chances in maximum oxygen consumption due to the impact of experimental treatment. Further, three-way analysis of variance (2 × 2 × 2) was used to find out the influence of each factor independently and also their combined influence. In all the cases the level of confidence was fixed at 0.05 level for significance.

RESULTS

The pre and post test mean and standard deviation values on VO_2 Max of active and sedentary men performed aerobic training with pranayama practices as well as aerobic training alone are given in table-I.

Table-I:Mean and Standard Deviation Values on VO_2 Max of Different Training Groups among Active and Sedentary Men subjects

Groups		Aerobic & Pranayama		Aerobic	
		Pre Test	Post Test	Pre Test	Post Test
Active	Mean	2.63	3.01	2.58	2.94
	SD	0.27	0.14	0.32	0.15
Sedentary	Mean	2.46	2.73	2.42	2.62
	SD	0.25	0.19	0.27	0.18

The pre and post test mean and standard deviation values on VO_2 Max capacity of aerobic training with prenayama groups (2.63± 0.27 & 3.01±0.14) as well as aerobic training alone group (2.58±0.32 & 2.94±0.15) of active men subjects and the pre and post test mean and standard deviation values on VO_2 Max capacity of aerobic training with prenayama groups (2.46±0.25 & 2.73±0.19) as well as aerobic training alone group (2.42±0.27 & 2.62±0.18) of sedentary men subjects are presented in this table (Table-I).

The pre and post test mean values on VO_2 Max of active and sedentary men performed aerobic training with pranayama practices as well as aerobic training alone groups are graphically represented in figure-I.

Figure- I:Graph Showing the Mean Values (Pre&Post) on VO_2 Max of Different Training Groups among Active and Sedentary Men subjects

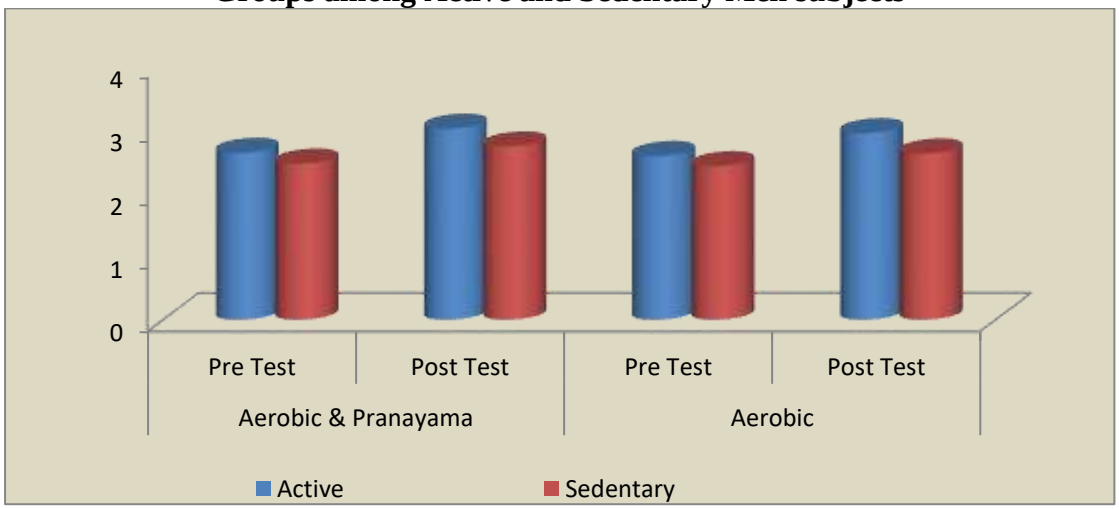

Table-II: Paired 'T' Test Result on VO_2 Max

Groups	Training	Mean Difference	'T'-Test	Percentage (%)
Active	**Aerobic & Pranayama (ATP)**	0.38	3.35*	14.50
	Aerobic Training (AT)	0.35	3.21*	13.59
Sedentary	**Aerobic & Pranayama (ATP)**	0.27	3.66*	10.98
	Aerobic Training (AT)	0.20	4.82*	8.23

** Table value: [df 9=2.26 (0.05 level)]*

The pre and post test mean difference on VO_2 Max of aerobic training with prenayama groups (MD=) as well as aerobic training alone group (MD=) of active men subjects varies considerably because the dependent't' test results of ATP (3.35) and AT (3.21) groups were better than the needed table value *[df 9=2.26 (0.05 level)]*.

Similarly, the pre and post test mean difference on VO_2 Max of aerobic training with prenayama groups (MD=) as well as aerobic training alone group (MD=) of sedentary men subjects varies considerably because the dependent't' test results of ATP (3.66) and AT (4.82) groups were better than the needed table value *[df 9=2.26 (0.05 level)]*.

Subsequent to 12 weeks of aerobic training with prenayama (ATP) and aerobic training (AT) 14.50% and 13.59% of changes in VO_2 Max was observed among active men subjects. Similarly, after 12 weeks of aerobic training with prenayama (ATP) and aerobic training (AT) 10.98% and 8.23% of changes in VO_2 Max was observed among sedentary men subjects.

The VO_2 Max data obtained from the different training groups of active and sedentary men have been analyzed by three way factorial ANOVA (2x2x2) as in table -II.

Table –II: Three Way Factorial ANOVA Results on VO_2 MAX Data (Pre&Post) of Different Training Groups among Active and Sedentary Men Subjects

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
Groups	1.04	1	1.04	18.87*
Training	0.08	1	0.08	1.61
Test	1.81	1	1.81	32.87*
Groups and Training	0.001	1	0.001	0.022
Groups and Tests	0.086	1	0.086	1.56
Training and Tests	0.013	1	0.013	0.23
Groups, Training and Tests	0.002	1	0.002	0.038
Error	3.97	72	0.055	

**Significant(.05 level)*
(Table values for df 1 & 72 is 3.96)

The obtained 'F' ratio value on VO_2 Max for groups (active & sedentary=18.87), and test (pre & post =32.87), are greater than the table value [df 1&72=3.96 (0.05 level)]. It proved that active and sedentary men differ from one another irrespective of training and testing conditions and also the aerobic training with prenayama (ATP) and aerobic training (AT) groups differ from one another irrespective of groups and tests. Similarly pre test value differ from the post test value irrespective of groups and training.

The obtained 'F' ratio value for interaction of training (ATP & AT =1.16), groups and training=0.02, groups and tests (F=1.56) , training and test (F=0.23) is lower than the table value [df 1&72=3.96 (0.05 level)]. However, the interaction of groups and training (0.03), the interaction of groups, training and test (0.03) are lesser than the table value [df 1&72=3.96 (0.05 level)].

DISCUSSION

Most of the previous studies also show a substantial increase in maximum oxygen consumption following aerobic training. During exercise, VO_2max increases in direct proportion to the rate of work. A person's VO_2max is in part genetically determined; it can be increased through training until the point that the genetically possible maximum is reached (Jorgensen et al., 1977). Increase in VO_2max generally range from 15 to 20 percent following a 6-month training period (Wilmore & Costill, 1994). A six-week training period can result in increases in VO_2max in participants undergoing high intensity (Hickson *et al*., 1981) and lower intensity training (Cunningham & Cantu, 1990). Like wise, Gormly *et al.,* (2008) study confirmed that 6-week varied intensities (moderate, near maximal and vigorous) of aerobic training significantly increased VO_2max. The high intensity exercises are more effective for improving VO_2max than lower intensity exercise in healthy young adults however when volume of exercise is controlled. Aerobi training refers to the variety of exercise that stimulates heart and lungs functions adequately long period to create positive alterations in body.

The findings of the study suggest that pranayama practice has a positive effect on physiological health measures. There was also an increment in VO_2max by 11 percent in yoga practitioners (Bowman et al., 1997). Practicing yoga nidra improves respiratory function by increasing vital capacity and breath holding capacity. Studies (Birkel & Edgren, 2000; Czamara, 2003; Cysarz & Bussing, 2005; Shenbagavalli & Divya, 2010) reported general health improvement through the enhancement of lung functions and the improvement of respiratory capacity. It is a known fact that the pranayama practices are best suited for developing physiological parameters. Pranayama practices improved maximum oxygen consumption and reduced the heart rate and blood pressure for the same task. This shows that there is a great improvement in all the physiological parameters. The reason may be due to the effect of yoga and breathing practices. It is inferred from the above literatures and from the results of the present study that systematically designed aerobic exercises and yogic practices develops the physiological parameters.

CONCLUSION

Subsequent to 12 weeks of aerobic training with pranayama (ATP) and aerobic training (AT) 14.50% and 13.59% of changes in VO_2 Max was observed among active men subjects. Similarly, after 12 weeks of aerobic training with pranayama (ATP) and aerobic training (AT)

10.98% and 8.23% of changes in VO_2Max was observed among sedentary men subjects. Further, active and sedentary men differ from one another irrespective of training and testing conditions and also the aerobic training with pranayama (ATP) and aerobic training (AT) groups differ from one another irrespective of groups and tests. Similarly pre test values differ from the post test value irrespective of groups and training. From the results of the present study and literature, it could be concluded that pranayama practices are not only effective in relaxation and stress management but also have a greater role in improving physiological functions.

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