



EFFECT OF YOGIC PRANAYAMA ON VO₂ MAX AMONG WORKING MEN AND WOMEN PHYSICAL EDUCATION TEACHERS OF DIFFERENT AGE GROUPS

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ABSTRACT

The basic purpose of the study was to examine the changes on Vo₂ max in response to pranayama practices among working men and women of different age groups. To achieve the purpose of this study, eighty middle aged school physical education teachers were selected from Virudhunagar District, in which 40 subjects were men and remaining 40 subjects were women. They were further categorized into four sub-groups of 20 subjects each. The first one is 35-40 age groups of men and women separately and another one 41-44 age groups of men and women separately. The Vo₂ max was selected as dependent variable for the study. During the training period, the experimental groups underwent pranayama practices six days a week for twelve weeks. Three-way analysis of variance was used to find out the influence of each factor independently and also their combined influence on each of the selected variables. The level of confidence was fixed at 0.05 for significance. The result of the study shows that due to the effect of pranayama practices the Vo₂ max of 35-40 and 41-45 age category men and women were significantly decreased. It also gives the existence of insignificant difference on Vo₂ max among gender in relevance to different age categories during pre and post tests.

KEYWORDS: Pranayama practices, Vo₂ max.

INTRODUCTION

An appropriate yoga practice first begins by giving attention to breathing. A person can live without food for about 30 days and without water for about three to six days. But a person can survive without the breath for only five to seven minutes before death. Obviously, breathing is imperative to the sustenance of life. But the breath also has a profound effect upon the nervous system. The yogis have known for thousands of years that there is an intimate connection between the body, the mind and the breath; and that emotions are directly affected by breathing. Accordingly, the yogis developed intricate methods of controlling the breath as a method of controlling the mind and body; metabolism, and emotions.

All our physiological processes are controlled by the nervous system. One branch of the nervous system, called the sympathetic nervous system (SNS), is affected by how we breathe. Rapid and shallow breathing depletes carbon dioxide, which causes the sympathetic nervous system to become activated. This results in increased heart rate and blood pressure, which leads to sweaty palms and feet, high levels of anxiety (the flight or fight syndrome), and more. Yoga breathing is an effective method that helps restore and maintain normal carbon dioxide levels. Yoga exercises become more comfortable and powerful when inhalation and exhalation flow freely. The subtle flowing of air into and out of the nose stimulates a relaxation response, which directly affects the brain and nervous system. Breathing

through the nose also warms and filters the air further reducing its impact upon the nervous system. Normal breathing oxygenates our blood and removes the noxious byproducts of metabolism and respiration. Controlled yoga breathing (pranayama) when appropriately practiced accelerates this process. The exercises of pranayama the correct breathing technique helps to manipulate our energies. Most of us breathe incorrectly, using only half of our lung capacity. Pranayama is a technique, which re-educates our breathing process, helps us to release tensions and develop a relaxed state of mind. It also balances our nervous system and encourages creative thinking. In addition, by increasing the amount of oxygen to our brain it improves mental clarity, alertness and physical well being.

When practiced along with yogasanas the benefits of pranayama are more pronounced. According to Patanjali's Yoga Sutra, pranayama enables the mind to acquire the capacity to concentrate on any given object of attention. It also says that scientific breathing helps in unveiling true knowledge from the darkness of ignorance. But it is eminently advisable to be aware of all the do's and don'ts of pranayama before practicing them.

METHODOLOGY

SELECTION OF SUBJECTS AND VARIABLES

The purpose of the study was to analyze the changes on Vo₂ max in response to pranayama practices among men and women school physical education

teachers of different age groups. To achieve the aim this study eighty middle aged school physical education teachers were selected from Virudhunagar District, in which 40 subjects were men and remaining 40 subjects were women. They were further categorized into four sub-groups of 20 subjects each. The first one is 35-40 age groups of men and women separately and another one 41-45 age groups of men and women separately. Random group design was used for the study, as it was most appropriate technique. As for as this study is concern the pranayama practices is independent variable and Vo2 max is a dependent variable and it was assessed by conducting one mile run test.

TRAINING PROGRAMME

The training programmes were scheduled for one session a day, each session lasted between one hour to one and half hours approximately including preparation and relaxation. During the training period, the experimental groups underwent pranayama practices six days a week for twelve weeks. The pranayama practices were consisted five pranayama along with warm up exercises of loosening the limbs and savasana as cool down activities. The training programme was

conducted in the morning sessions from 6 `O`clock onwards.

COLLECTION OF THE DATA

The pre test data was collected prior to the experimental treatment and post test data was collected after twelve weeks of pranayama practices from the different age categories of men and women groups on Vo2 max.

EXPERIMENTAL DESIGN AND STATISTICAL TECHNIQUE

The application of dependent ‘t’ test was computed for significance. Three-way analysis of variance is used to find out the influence of each factor independently and also their combined influence on the selected variable. Data were calculated with the help of SPSS package.

RESULT

The descriptive analysis of the pre and post test data showing mean and standard deviation and ‘T’ ratio on Vo2 max of men and women of different age groups is presented in table-I.

**TABLE – I
DESCRIPTIVE ANALYSIS OF THE DATA AND ‘T’ RATIO ON VO2 MAX OF WORKING MALE AND FEMALE SCHOOL PHYSICAL EDUCATION TEACHERS OF DIFFERENT AGE GROUPS**

Gender	Age Category	Test	Mean	Standard Deviation	Mean Differences	‘T’ ratio
Male	35-40 years	Pre test	3.01	0.13	0.38	7.55*
		Posttest	3.39	0.16		
	41-45 years	Pre test	2.93	0.22	0.46	5.98*
		Posttest	3.39	0.25		
Female	35-40 years	Pre test	2.99	0.13	0.20	11.90*
		Posttest	3.19	0.16		
	41-45 years	Pre test	2.97	0.11	0.19	13.76*
		Posttest	3.16	0.11		

**Significant at 0.05 level*

The table value required for significant for df 14 is 2.14.

Table-I shows that the pre-test and post test mean and standard deviation values on Vo2 max of 35-40 age category working men pranayama practices group are 3.01 ± 0.13 and 3.39 ± 0.16 respectively. It resulted with a mean difference of 0.38. The obtained ‘t’ ratio is 7.55 and it is higher than the table value of 2.14 required for significance at 0.05 level for df 14. Hence, it is concluded that due to the effect of pranayama practices the Vo2 max of 35-40 age category working men was significantly increased. The pre-test and post test mean and standard deviation values on Vo2 max of 41 to 45 age category of men pranayama practices group are 2.93 ± 0.22 and 3.39 ± 0.25 respectively. It resulted with a mean difference of 0.46. The obtained ‘t’ ratio is 5.98 and it is higher than the table value of 2.14 required for significance at 0.05 level for df 14. Hence, it is

concluded that due to the effect of pranayama practices the Vo2 max of 41 to 45 age category working men was significantly increased.

Table-I also shows that the pre-test and post test mean and standard deviation values on Vo2 max of 35-40 age category of women pranayama practices group are 2.99 ± 0.13 and 3.19 ± 0.16 respectively. It resulted with a mean difference of 0.20. The obtained ‘t’ ratio is 11.90 and it is higher than the table value of 2.14 required for significance at 0.05 level for df 14. Hence, it is concluded that due to the effect of pranayama practices the Vo2 max of 35-40 age category women was significantly increased. The pre-test and post test mean and standard deviation values on Vo2 max of 41 to 45 age category of working women pranayama practices group are 2.97 ± 0.11 and 3.16 ± 0.11

respectively. It resulted with a mean difference of 0.19. The obtained 't' ratio is 13.76 and it is higher than the table value of 2.14 required for significance at 0.05 level for df 14. Hence, it is concluded that due to the effect of pranayama practices the Vo2 max of 41 to 45 age category working women was significantly increased.

The pre and post test data collected from the different age category working school physical education teachers men and women on Vo2 max was statistically analyzed by three factor factorial analysis and the results are presented in table-II.

TABLE -II
THREE FACTOR FACTORIAL ANALYSIS ON VO2 MAX

Source	Sum of Squares	df	Mean Squares	'F' ratio
Gender	12.67	1	12.67	6.32*
Age	8.01	1	8.01	3.99*
Test	343.40	1	343.40	171.39*
Gender & Age	0.67	1	0.67	3.73*
Gender & Tests	9.07	1	9.07	4.52*
Age & Tests	1.87	1	1.87	0.93
Gender, Age & Tests	0.21	1	0.21	0.11
Error	224.40	112	2.004	

*Significant at .05 level of confidence

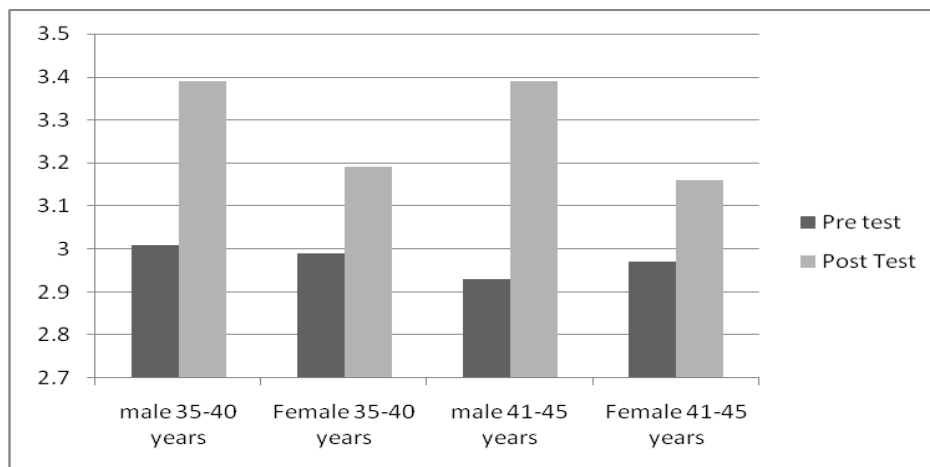
(Table values required for significance at .05 level with df 1 and 112 is 3.92)

Table-II reveals that men and women differ significantly on Vo2 max irrespective of age and tests, since the obtained f ratio value of 6.32 is greater than the required table value of 3.92 for the degrees of freedom 1 and 112. It also proved that significant differences exist between age categories irrespective of gender and tests, since the obtained f ratio value of 3.99 is greater than the required table value of 3.92 for the degrees of freedom 1 and 112. Further, it reveals that significant differences exist between tests irrespective of gender and age, since the obtained f ratio value of 171.39 is greater than the required table value of 3.92 for the degrees of freedom 1 and 112. The obtained 'F' ratio value for interaction of gender and age irrespective of testing conditions is 3.73, which is higher than the table value of 0.34 for the degrees of freedom 1 and 112 required for significance at 0.05 level of confidence. The result of the study shows that significant difference exists for the interaction of gender at different age categories on Vo2 max irrespective of testing conditions. The results of the study also show that the obtained 'F' ratio value for the interaction of age and testing conditions irrespective of

gender is 4.52, which is higher than the table value of 3.92 for the degrees of freedom 1 and 112 required for significance at 0.05 level of confidence. It reveals significant difference that exists on Vo2 max among different age categories at pre and post tests irrespective of gender.

The obtained 'F' ratio value for interaction of gender and tests irrespective of age categories is 0.93, which is lesser than the table value of 3.92 for the degrees of freedom 1 and 112 required for significance at 0.05 level of confidence. The result of the study shows that no significant difference exists for the interaction of gender at different age categories on Vo2 max irrespective of testing conditions. It is observed that the obtained 'F' ratio value for the interaction of gender, age and testing conditions is 0.11, which is lesser than the table value of 3.92 for the degrees of freedom 1 and 112 required for significance at 0.05 level of confidence. It confers the existence of insignificant difference on Vo2 max among gender in relevance to different age categories during pre and post tests.

FIGURE – I
DIAGRAM SHOWING THE PRE AND POST TEST MEAN VALUE ONVO2 MAX AMONG MEN AND WOMEN OF DIFFERENT AGE GROUPS



DISCUSSION

The certain effect of yoga practices on high blood pressure has been confirmed in various studies. Madanmohan et al (2005) found that different types of pranayams produce different physiological responses in normal young subjects. The findings of this study is in agreement to the findings of Lohan and Rajesh (2002), who found ten weeks asanas programmes has significantly improved pulse rate and other physiological variables

The result of this study was in same line with the findings of Joshi *et al.*, (1996) who reported that six weeks yogasana and pranayama improved the prolongation of breath holding time. This study is also shows positive with the findings of Makwana et al., (1988) who showed that ten weeks yoga practice increased breath holding time.

The best variable of cardiorespiratory fitness is maximal oxygen uptake or aerobic power. $VO_2\text{max}$ is measured in healthy persons during big muscle, important activity. $VO_2\text{max}$ is primarily lined by the oxygen transport capacity of the cardiovascular system (Mitchell & Blomqvist, 1971). $VO_2\text{max}$ is most accurately measuring by expired air composition and respiratory volume during maximal exertion. During exercise, VO_2 increases in direct proportion to the rate of work done. The point at which a person's VO_2 is no longer able to increase is defined as the maximal oxygen uptake ($VO_2\text{max}$). A person's $VO_2\text{max}$ is hereditary one; it can be increased through training until the point that the genetically possible maximum is reached (Jorgensen et al., 1977). Muscles are like engines that run on fuel; Human muscles use fat and carbohydrates instead of gasoline. Oxygen is a fire because, once inside the muscle, it is used to burn fat and carbohydrate for fuel to keep our body running. The more efficient our muscles are at consuming oxygen, the more fuel one can burn and the longer one can exercise.

CONCLUSION

The result of the study shows that due to the effect of twelve weeks of pranayama practices the $VO_2\text{max}$ of 35 to 40 and 41 to 45 age category school physical education teachers men and women were significantly changed. The result of the study also gives the existence of insignificant difference on $VO_2\text{max}$ among gender in relevance to different age categories during pre and post tests.

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