

**INFLUENCE OF YOGIC PRACTICES COMBINED WITH PHYSICAL EXERCISES ON PULMONARY FITNESS OF SCHOOL GIRLS**

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**ABSTRACT**

Exercise has shown to improve health prospects in various ways. Yoga practices significantly contribute for healthful living. The aim of this study was to find out the effect of yogic practices and combined physical exercises and yogic practices on selected pulmonary fitness of schools girls. The subjects (n=60) were randomly assigned to three equal groups of twenty school boys each. The experimental groups participated in their respective yogic practices (YPG) and combined physical exercises and yogic practices (PYPG) for a period of twelve weeks. The results proved that YPG and PYPG significantly improved  $VO_2$  max and breath holding time ( $P < 0.05$ ). Though vital capacity was also improved due to experimental treatments, the improvement was not significant at alpha level of 0.05. Comparing between the treatment groups, YPG was found to be better than PYPG group in improving breath holding time. It was concluded that yogic practices can be implemented among school girls to improve their pulmonary fitness variables.

**Key words: Pulmonary fitness, vital capacity,  $VO_2$  max, breath holding time, Yogic practices, combined physical exercises and yogic practices.**

**INTRODUCTION**

Regular physical exercise enhance the function of the joints; increase the sense of physical well-being and promotes a sense of feeling good; increases physical working capacity by increasing cardiorespiratory fitness, muscle strength and endurance and decreases the risk of serious diseases that could lead to early disability and death. Ukoho (1988) expressed that exercise has shown to improve health prospects in various ways. It helps to reduce body fat and overall weight and reduce blood pressure. Exercise ensures better digestion, respiration and efficient blood circulation.

Yogasanas are simple actions for keeping the internal and external parts of the body in good health. No activity can be performed well so long as the internal and external parts of the body are not in good health. Yoga has a complete massage for humanity. It is a message for the human body, human mind and human body, human

mind and human soul. (Swami Kuvalayananda, 1977). Health, Physical fitness and emotional stability are the objectives which bring yoga and physical education on a common platform for the benefit of human individual. Yoga is isometric and internal. It is content between our inherent inertia and the power of the will. Parts of the body are pitted against one another and a unique harmony of body, mind and breath is developed. Yoga helps to develop all system of human body such as cardiovascular, respiratory, digestive, eliminative, endocrine, nervous and muscle-skeletal system thus strengthening, cleansing and purifying the body so that it is brought under our conscious will. Lung functions can be improved as a result of yogic exercise (Gharote, 1982). Yoga is also useful for improving the breath holding time (Gharote, 1982).

Madan Mohan, et.al.(2003) studied the effects of yoga training on cardiovascular response to exercise and the time course of recovery after the exercise and concluded yoga training a given level of exercise leads to a milder cardiovascular response, suggesting better exercise tolerance. Ray, et.al. (2001) undertook a study to observe any beneficial effect of yogic practices during training period on the young trainees on physiological parameters like heart rate, blood pressure, oral temperature, skin temperature in resting condition and found significant changes due to yogic practices. Kraemer et.al. (2001) conducted a study on resistance training combined with bench-step aerobics which enhances women's health profile and recorded significant reductions in resting diastolic blood pressure and strengthened VO<sub>2</sub> max.

Thus, the theoretical foundations laid through the previous researches clearly showed that while yogic practices stabilizes physiological parameters and physical exercises contribute for the physiological fitness. Further, researches among school boys on the effect of yogic practices combined with physical exercises on selected pulmonary fitness variables, namely, vital capacity VO<sub>2</sub> max, and breath holding time are scarce and hence, the investigator was interested to find out the influence of yogic practices combined with physical exercises on selected pulmonary fitness variables, namely, vital capacity, VO<sub>2</sub> max and breath holding time of school boys.

## **METHODS**

The subjects (n=60) were randomly assigned to three equal groups of twenty school girls each. Pre tests were conducted for all the subjects on selected physiological variables, which influences pulmonary fitness, namely, vital capacity, VO<sub>2</sub> max and breath holding time. The experimental groups participated in their respective yogic practices (YPG) and combined physical exercises and yogic practices (PYPG) for a period of twelve weeks. The YPG group was given the yogasanas as shown in Table I. and the PYPG group was given the yogasanas as in Table I and physical exercises as in Table II.

**Table I**  
**YOGIC PRACTICES PRESCRIBED**

<b>S.No</b>	<b>Yogic Practices</b>	<b>Duration</b>
1	Loosening exercises	3 minutes
2	Surya Namaskar	5 minutes
3	Halasana	3 minutes
4	Bhujangasana	2- 3 minutes
5	Salabasana	2- 3 minutes
6	Dhanurasana	2- 3 minutes
7	Paschimotanasana	2- 3 minutes
8	Nadi Sodhana Pranayama	2- 3 minutes
9	Kapalvali Pranayama	2- 3 minutes
10	Savasana	2- 3 minutes

**Table II**  
**PHYSICAL EXERCISES PRESCRIBED**

<b>S.No</b>	<b>Circuit Stations</b>	<b>Duration of Exercise in Each Station</b>
1	On the spot running	2 minutes
2	Leg cycling	2 minutes
3	Push up	2 minutes
4	Squat Jump	2 minutes
5	Vertical Jump and turn	2 minutes
6	Pull ups	2 minutes
7	Leg thrust	2 minutes
8	Sit ups	2 minutes

Rest in each station – 1 minute.

Rest in between circuit – 4 minutes

Number of circuits – 3

3 days a week for 12 weeks

The post tests were conducted on the above said dependent variables after a experimental treatment. The difference between the means of pre and post test scores was considered as the effect of yogic practices and combined physical exercise and yogic practices. To test the significance of the difference, Analysis of Covariance (ANCOVA) was used. Scheffe’s post hoc analysis was made to test the pairs of means. In all cases 0.05 level was fixed to test the hypothesis of the study.

**RESULTS**

The descriptive statistics, containing mean, standard deviation for pre test and post test scores of control and experimental groups on selected pulmonary fitness variables before and immediately after the respective experimental treatment are presented in Table III.

**Tab III: Descriptive Statistics of Pre and Post Test Scores on Selected Pulmonary Fitness Variables – Vital Capacity, VO<sub>2</sub> max and Breath Holding Time**

Variables	Groups	Pre Test		Post Test	
		$\bar{\chi}$	$\sigma$	$\bar{\chi}$	$\sigma$
Vital Capacity	Control Group (CG)	3557.5	455.5	3627.5	382.0
	Yogasana Group (YPG)	3442.5	460.1	3636.3	475.0
	Physical Exercise and Yogasana Group (PYPG)	3730.0	431.2	3812.5	400.0
VO <sub>2</sub> Max	Control Group (CG)	41.32	4.15	41.29	3.39
	Yogasana Group (YPG)	40.72	3.85	43.62	4.17
	Physical Exercise and Yogasana Group (PYPG)	41.24	4.54	44.70	4.05
Breath Holding Time	Control Group (CG)	38.10	4.72	38.05	4.65
	Yogasana Group (YPG)	42.85	8.56	52.25	8.00
	Physical Exercise and Yogasana Group (PYPG)	42.30	8.28	54.45	8.81

The descriptive statistics presented in Table 3 shows that there was improvement in pulmonary fitness variables, vital capacity, VO<sub>2</sub> max and breath holding time 12 weeks yogic practices and 12 weeks physical exercises combined with yogic practices.

ANCOVA was employed to test the significance of the improvement and the result is presented in Table IV

**Tab IV: Analysis of Covariance on Selected Pulmonary Fitness Variables due to Yogic Practices, Physical Exercises and Yogic Practices**

Variables	Groups	Adjusted Mean	Source of Variance	Sum of Squares	Df	Mean Square	'F' Ratio
Vital Capacity	Control Group (CG)	3644.34	Between	123706.1	2	61843.07	2.83
	Yogasana Group (YPG)	3754.14					
	Physical Exercise and Yogasana Group (PYPG)	3677.77	Within	1223997.7	56	21857.	
VO <sub>2</sub> Max	Control Group (CG)	41.12	Between	135.0	3	67.62	13.03*
	Yogasana Group (YPG)	43.90					
	Physical Exercise and Yogasana Group (PYPG)	44.59	Within	290.3	56	5.18	
Breath Holding Time	Control Group (CG)	40.87	Between	1583.7	3	791.87	143.37*
	Yogasana Group (YPG)	50.58					
	Physical Exercise and Yogasana Group (PYPG)	53.30	Within	309.3	56	5.52	

Required table value for significance at 0.05 level of confidence for df of 2 and 56 is 3.16.

\* Significant

The statistical treatment using ANCOVA showed that the improvement in the means of pulmonary abilities, Vital capacity, VO<sub>2</sub> max, and Breath Holding time due to yogic practices and combined physical exercises and yogic practices. The improvements were significant at alpha level of 0.05 on VO<sub>2</sub> max and breath holding as the obtained F values 13.03 and 143.37 respectively were greater than the required table F value of 3.16 to be significant at 0.05 level. Since significant results were obtained, the results were

further subjected statistical treatment using Scheffe's post hoc test and presented in Table V

**Table V**

**Multiple Comparison of Means of Experimental and Control Groups using Scheffe's Confidence Interval Test Scores on VO<sub>2</sub> Max and Breath Holding Time**

ADJUSTED POST TEST MEANS FOR VO <sub>2</sub> MAX				Required C I
Combined (Yogic and Physical Exercises)	Yogic Practices	Control	Mean Difference	
44.59	43.90		0.68	1.81
44.59		41.12	3.47*	1.81
	43.90	41.12	2.79*	1.81
ADJUSTED POST TEST MEANS FOR BREATH HOLDING TIME				
53.30	50.58		2.72*	1.87
53.30		40.87	12.43*	1.87
	50.58	40.87	9.71*	1.87

\* Significant

**DISCUSSION ON FINDINGS**

Regular exercise stimulates changes in the cardiovascular system, lungs, and muscle cells which improve athletic ability. Added health benefits include a decrease in resting heart rate and a lowering of maximal blood pressure with submaximal exercise. The cardiovascular (heart and blood vessels) and pulmonary (lungs) systems work together to deliver the oxygen necessary for efficient (aerobic) energy metabolism to the exercising muscle. Oxygen is extracted from air in the lungs and then transported in the blood to the cells where it is extracted and utilized. The pulmonary fitness of the schools students are intended through vital capacity, VO<sub>2</sub> max and breath holding time which are directly involved in the pulmonary functions.

Researches by Reddy and Ravikumar (2001), Maity and Samanta (2001) and Tiken, Kosana, Joy and Inaobi (2002) have found that yogasana improved significantly motor fitness of girls and boys. Studies by Ray, et.al. (2001), Lohan and Rajesh (2002), Madanmohan et al., (2003), proved both physical and physiological variables of adults could be improved through yogasanas. Studies of Harinath et. al., (2004), Schell, Allolio and Schonake (1994) and Berger and David (1988) found that physiological and psychological variables could be beneficially altered among young adults. There is

dearth of studies to find out the effect of yogasanas and combined effect of yogasanas and physical exercises on pulmonary fitness of on selected motor fitness, physiological and psychological variables among juvenile delinquents, especially in our region. Hence, this research was made out and the results presented in this chapter. The discussions on the results of this study are presented in this part.

The results presented in Table IV proved that there was an increase in vital capacity of the school students of yogic practices group (YPG) from the pre test mean value of 3442 ml to post test mean value of 3636 ml. The physical exercises and yogic practices group (PYPG) group pre test mean value of 3730 ml was increased to 3812 ml, which the control group's (CG) pre test mean was 3627 ml and post test mean was 3442 ml. The increase due to experimental treatment was tested for significance using ANCOVA and the obtained F value of 2.82 was less than the required table F value of 3.16 to be significant at alpha level of 0.05. Thus, it was proved though the experimental treatments increased the vital capacity of the school students, the improvement was not statistically significant.

The  $VO_2$  max results due to experimental treatments (Table IV) on school students proved to be significant as the obtained F value of 13.03 was greater than the required table F value of 3.16 to be significant at alpha level of 0.05. The post hoc analysis (Table V) proved that there was significant mean difference between experimental group YPG and CG and PYOG and CG. Comparing between the experimental groups, YPG and PYPG proved that there was no significant difference in improving  $VO_2$  max of the school students.

The effect of YPG and PYPG on breath holding time of the school students proved that the experimental treatments significantly improved breath holding time of the school students, as the obtained F value of 143.37 was greater than the required F value to be significant at 0.05 level. The post hoc analysis proved (Table V) that there was significant mean difference between experimental group YPG and CG and PYOG and CG. Comparing between the experimental groups, YPG and PYPG proved that there was

significant difference in improving breath holding time among YPG of the school students.

Thus, the results proved that yogic practices and physical exercises contributed for improving pulmonary fitness assessed through vital capacity, VO<sub>2</sub> max and breath holding time of the school girls. The findings of this study are in agreement with the findings of Ray, et.al. (2001), Lohan and Rajesh (2002), Madanmohan et al., (2003), who proved physiological variables of adults could be improved through yogasanas. And findings (Gharote, 1982) that lung functions can be improved as a result of yogic exercise. Yoga is also useful for improving the breath holding time. It was concluded that yogic practices can be provided to the school students to improve their pulmonary fitness.



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