



ISSN: 2456-4419

Impact Factor: (RJIF): 5.18

Yoga 2019; 4(1): 1181-1184

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www.theyogicjournal.com

Received: 07-11-2018

Accepted: 09-12-2018

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## Effect of yogic practices and therapeutic exercise on vital capacity of person with chronic obstructive pulmonary disease

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### Abstract

**Objective:** The purpose of the study was to find out the effect of yogic and therapeutic exercise on vital capacity of person with chronic obstructive pulmonary disease.

**Methods:** For the purpose of this study 45 male from Varanasi those who are suffering from COPD (chronic bronchitis) and under treatment process of same at S.S. hospital, IMS, B.H.U was selected purposively as the subject of the study. The age of subjects was ranged between 40 to 50 years. For the study pre test – post test randomized group design was used and involving 45 subjects who were grouped purposively into three groups (15 each). The first group 15 subjects were considered as control group, second 15 subjects were considered as experimental group A (Postural drainage with yogic practices), and last 15 subjects were considered as experimental group B (with postural drainage with therapeutic exercise). Vital capacity was measured by pulmonary function test or Total lungs function test and scores was recorded in liters.

**Statistical technique:** The data which was obtained from subject was analyzed statistically by the application of analysis of covariance (ANCOVA). The obtained “F” ratio was tested at .05 level of significance.

**Results & Conclusion:** The results of the study showed that there is significant effect of yogic and therapeutic exercise program on vital capacity. It is concluded that yogic exercise and therapeutic exercise program have better and equal effect for improvement of COPD patients.

**Keywords:** Yogic exercise, therapeutic exercise, vital capacity & pulmonary function test

### Introduction

The clinical definition, excess secretion of mucus is the consequence of an increase in the size and number of seromuscular secreting structure in the bronchi. There is a measurable increase in thickness of the glandular layer of wall. The ratio of bronchial gland thickness to bronchial wall thickness, the “Reid-index”, is one measure of the increase in mucus secreting capacity in chronic bronchitis. The Reid-index and other measurement of relative gland size help to discriminate groups of bronchitis from non-bronchitis, but always overlap.

Goblet cell metaplasia has been reported in same patient with chronic bronchitis but does not appear to be a constant finding. The appearance in cigarette smoking of many goblet cell in terminal bronchioles, where they are not normally found, may alter the composition and physical characteristics of the lining these airway. Physiotherapists have speculated that a change in the mechanical properties of the surface layer may have contributed to the abnormalities of small airways function that can nearly always be found in smokers. A more straight forward explanation for bronchitis are the same in number but narrower in diameter than those of non-bronchitis. The narrowing in structural, presumably from inflammatory changes, although striking infiltration with inflammatory cell is surprisingly inconspicuous in lungs of patient with chronic bronchitis.

The amount of bronchial smooth muscle does not appear to be increased in patient with simple chronic bronchitis. Smooth muscle hyperplasia has been noted in patient with asthmatic bronchitis and probably is the structural basis for the airways hyperactivity in this disorder. The most frequent symptoms of COPD are gradually progressive breathlessness and cough.

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The cough is often productive and usually worse in the morning, but its severity is unrelated to the degree of airflow obstruction. Repeated respiratory infections are common, and are often associated with exacerbations of the airflow obstruction and symptomatic deterioration.

**Methodology**

For the purpose of study 45 male patients from Varanasi those who are suffering from COPD (chronic bronchitis) and under treatment process of same at S.S. hospital, IMS, B.H.U was selected purposively as the subject of the study. The age of subjects was ranged between 40 to 50 years. For the study pre test – post test randomized group design was used and involving 45 subjects who were grouped purposively into three groups (15 each). The first group 15 subjects were considered as control group, second 15 subjects were considered as experimental group A (Postural drainage with yogic practices), and last 15 subjects were considered as experimental group B (with postural drainage with therapeutic exercise).

Control Group O1 O2  
 Yogic Group O3 T1 O4  
 Therapeutic exercise Group O5 T2 O6  
 O = Observation, T = Treatment

Vital capacity was measured by pulmonary function test or Total lungs function test and scores was recorded in liters. The experiment group A was taken 6 weeks yogic exercise training, in this training program only Pranayam exercise performed by subjects. The experimental group B was taken 6 weeks therapeutic exercise, in this program only breathing exercise performed by the subjects. The data which was obtained from subject was analyzed statistically by the application of analysis of covariance (ANCOVA). The obtained “F” ratio was tested at .05 level of significance.

**Findings**

The data are analyzed and the results pertaining to Descriptive Statistics of Experimental Group (Yogic and therapeutic exercise group) and Control Group in relation to vital capacity are presented with the help of table 1.

**Table 1:** Descriptive Statistics of Yogic exercise group, Therapeutic exercise group and Control Group in relation to vital capacity

		N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Pre Test	Yoga Group	15	3.26	0.21	0.05	3.00	3.80
	Therapeutic Group	15	3.08	0.17	0.04	2.80	3.60
	Control Group	15	3.18	0.20	0.05	3.00	3.80
Post Test	Yoga Group	15	3.48	0.21	0.05	3.20	4.00
	Therapeutic Group	15	3.33	0.16	0.04	3.10	3.80
	Control Group	15	3.21	0.18	0.04	3.00	3.80

Table 1 clearly indicates that the mean and standard deviations of vital capacity at different groups (yoga group, therapeutic group, and control groups). The observed mean and standard deviation of pre test, vital capacity of yoga group  $3.26 \pm 0.21$ , Therapeutic group  $3.08 \pm 0.17$  & control group  $3.18 \pm 0.20$ ; and Post test, vital capacity of yoga group  $3.48 \pm 0.21$ , Therapeutic group  $3.33 \pm 0.16$ , & Control group

$3.21 \pm 0.18$  are respectively.

The data are further analyzed with the help of analysis of variance to find out the significance difference between means of pre-test and post test of yoga group, therapeutic group and control group in relation to vital capacity. The results are presented in the table no 2.

**Table 2:** Analysis of Variance of Comparison of Means of Yogic exercise group, Therapeutic exercise group and Control Group in Relation to vital capacity

	Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Pre Test	Between Groups	0.246	2	0.123	3.005	.060
	Within Groups	1.717	42	0.041		
	Total	1.963	44			
Post Test	Between Groups	0.563	2	0.282	7.947*	.001
	Within Groups	1.488	42	0.035		
	Total	2.051	44			

Table 2 revealed that, the pre test obtained ‘F’ value of 3.005 is found to be no significant at 0.05 level, explains the random assignment of subjects to yogic exercise group, Therapeutic exercise group and control group is quite successful. In

relation to post test, significant difference is found among yogic exercise group, Therapeutic exercise group and control group pertaining to vital capacity.

**Table 3:** Adjusted post test means of yogic exercise group, Therapeutic exercise group and control group in relation to vital capacity

Groups	Mean	Std. Error
Yoga Group	3.415	0.020
Therapeutic Group	3.415	0.020
Control Group	3.204	0.020

From the table 3, it is revealed that mean of yoga group is 3.415 with the standard error of 0.020 and mean of therapeutic exercise group is 3.415 with the standard error of 0.020, whereas the mean of control group is 3.204 with the standard error of 0.020. The data are analyzed and the results

pertaining to analysis of co-variance among yoga group, Therapeutic exercise group and control group of COPD person in relation to vital capacity for pre test -post test respectively and the results are presented in table 4.

**Table 4:** Analysis of Covariance of Comparison of Adjusted post test means of yogic exercise group, Therapeutic exercise group and Control Group in relation to vital capacity

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	0.444	2	0.222	38.118*	.000
Error	0.239	41	0.006		

Table 4 revealed that, the obtained 'F' value of 38.118 is found significant at 0.05 levels. This result indicates that the treatment (yogic and therapeutic exercise) is given to subjects

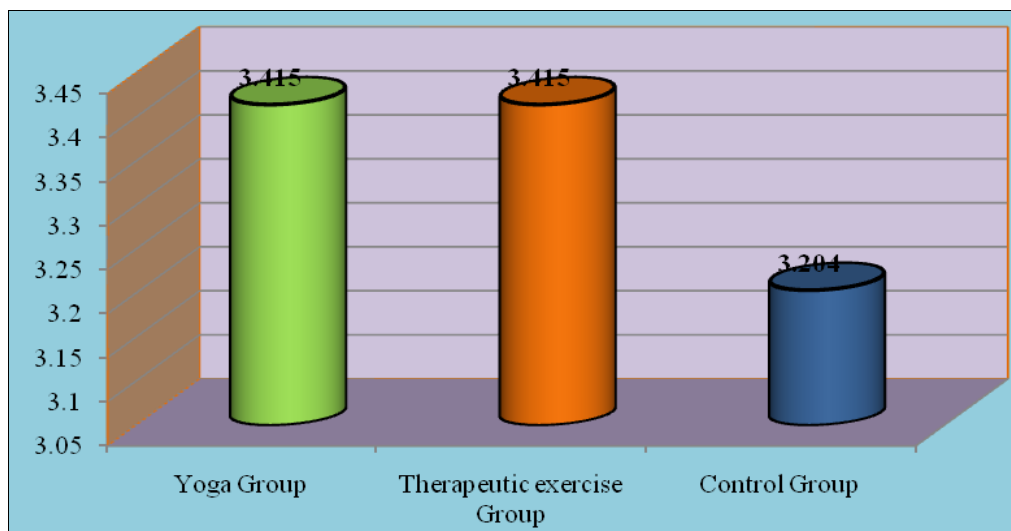
has increase vital capacity of subjects, but which treatment group is better to other treatment group, LSD post hoc test is applied.

**Table 5:** LSD Post-hoc Test for the comparison of paired means of yogic exercise group, Therapeutic exercise group and Control Group in relation to Vital capacity

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
Control	yoga	-.211*	.028	.000
	therapeutic	-.211*	.029	.000
yoga	therapeutic	.000	.030	.995

It is evident from table 5 that significant difference is found between adjusted final mean scores of control group & yoga group and control group & therapeutic group. The no significant difference is found between adjusted final mean score of Yoga group and therapeutic group, it is evident that

both yoga and therapeutic exercise program have same effect on vital capacity of subjects. The Graphical representation of mean of yoga group, therapeutic exercise group and control group in relation to vital capacity is presented with the help of figure 1.



**Fig 1:** The Graphical representation of mean scores of yogic exercise group, therapeutic exercise group and control group in relation to vital capacity

**Discussion of Findings**

In the present study, there is significant effect of yoga and therapeutic exercise program on vital capacity. Significant difference between the adjusted means of the control group and yoga group on the data of vital capacity during post testing. Significant difference between the adjusted means of the control group and therapeutic exercise group on the data of vital capacity during post testing. No significant difference between the adjusted means of the yoga group and therapeutic exercise group on the data of vital capacity during post testing.

In the present study yoga and therapeutic exercise is improve the vital capacity of COPD patients after 6 weeks. It is likely that the improvement of respiratory function and increased chest wall expansion in the present study were resulted from the increased respiratory muscle strength. Like other types of exercise, Yoga practice decreased reaction time, indicating improvement of neuro-muscular system (Bhavanani et al., 2003). Increased nerve conduction velocity was reported in dynamic exercise (Masuda et al., 2001; Ross et al., 2001), but not yet in the Yoga training. Abdominal breathing uses the

diaphragm primarily and is congruent with the shape of the lungs and the capacities of the breathing muscles. It performs respiration with the least effort and is associated with mental stability and calmness. In contrast chest breathing utilizes primarily inter costal muscle plus accessory breathing muscles: trapizius, scalenes, pectoral, and sterno mastoid (Chaitow and Bradley, 2002; Frownfelter, 1978; Levenson, 1992). It is less efficient, aerates less of the lung, fatigues the neck and upper chest if used habitually and is associated with urgency and anxiety (Gilbert, 1999).

**Conclusions**

On the basis of the interpretation of data the following conclusion were drawn from this study.

It is concluded that there is significant effect of yoga and therapeutic exercise program on vital capacity.

1. It is concluded that there is a significant difference between the adjusted means of the control group and yoga group on the data of vital capacity during post testing.
2. It is concluded that there is a significant difference

between the adjusted means of the control group and therapeutic exercise group on the data of vital capacity during post testing.

3. It is concluded that there is no significant difference between the adjusted means of the yoga group and therapeutic exercise group on the data of vital capacity during post testing.

### Practical Applications

The results of this study provide insight into yogic and therapeutic exercise program for improvement of vital capacity of COPD patients. However COPD patients are suffering from breathing problem in during period of disease. This research paper provides better knowledge for improvement of COPD patients through Yogic exercise and therapeutic exercise program.

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