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Effect of 6 weeks of pranayama on forced expiratory volume of person with COPD

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Abstract
Objective: The purpose of the study was to find out the effect of 6 weeks of Pranayama on forced expiratory volume of person with COPD.
Methods: For the purpose of this study 30 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 30 subjects who were grouped purposively into two groups (15 each). The first group 15 subjects were considered as control group and second 15 subjects were considered as experimental group. Forced expiratory volume 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 6 weeks of Pranayama on Forced expiratory volume. It is concluded that Pranayama have better effect for improvement of COPD patients in relation to Forced expiratory volume.

Keywords: pranayama, forced expiratory volume & pulmonary function test

Introduction

Yoga Philosophy is one of the six systems of Hindu Philosophy which exist in India. Unlike so many other philosophies of the world, it is a philosophy that is wholly practical. Yoga is an exact science based on certain immutable Laws of Nature. It is well known to people of all countries of the world interested in the study of Eastern civilisation and culture, and is held in awe and reverence as it contains in it the master-key to unlock the realms of Peace, Bliss, Mystery and Miracle. Even the philosophers of the West found solace and peace in this Divine Science. Jesus Christ himself was a Yogi of a superior order, a Raja-Yogi indeed. The founder of the Yoga Philosophy was Patanjali Maharshi, who was not only a Philosopher and a Yogi, but a Physician as well. He is said to have lived about three hundred years before Jesus Christ.

Patanjali defines Yoga as the suspension of all the functions of the mind. As such Yoga, which does not deal with these three aspects of the subject, viz., mind, its functions and the method of suspending them, can he safely laid aside as unreliable and incomplete. The word Yoga comes from the Sanskrit root "Yuj" which means "to join." Yoga is a science that teaches us the method of joining the individual soul and the Supreme Soul. It is the merging of the individual will with the Cosmic or Universal Will. Yoga is that inhibition of the functions of the mind which leads to the absolute abidance of the soul in its own real nature of Divine Glory and Divine Splendour. It is the process by which the identity of the individual soul and the Oversoul is established by the Yogi. In other words, the human soul is brought into conscious communion with God. Yoga is the Science of sciences that disentangles the individual soul from the phenomenal world of sense-objects and links with the Absolute, whose inherent attributes are Infinite Bliss, Supreme Peace, Infinite Knowledge and unbroken Joy.

One of the most appealing aspects of Yoga is that participants are encouraged to individualize their practice and make it their own. It's up to the individual to determine how challenging or how gentle he/she wants the program to be. One can gently move through the poses or choose to focus deeply on the muscles being used, experiencing the pose in a different light. In all cases, the postures (asanas) help the muscles relax by improving circulation, thus relieving built-up tension and stress. Stretching helps tone and condition the muscles, and this helps prevent injuries. Yoga instructors will, however, generally remind students not to push their bodies too far. It's important in all aspects of a fitness program to know and respect one's limits.

The science of pranayama was developed by highly evolved yogis through an intuitive and experiential understanding of prana and its influence on the human mechanism at various levels. The agency of the breath was used to access the pranic field, to attain balance in the body and control of the mind. The practices would render the body-mind instrument capable of experiencing higher states of consciousness so that the ultimate union with the transcen-dental reality could be experienced.

The breath being the medium of pranayama, the system is based on the three stages of respiration: inhalation (pooraka),

retention (kumbhaka) and exhalation (rechaka). By permuting and directing these three stages, the different practices of pranayama are obtained.

Chronic Obstructive Pulmonary condition COPD, or chronic obstructive pulmonary (PULL-MUN-ARY) disease, is a progressive disease that makes it hard to breathe. "Progressive" means the disease gets worse over time.

- Chronic means it won't go away.
- Obstructive means partly blocked.
- Pulmonary means in the lungs.
- Disease means sickness.

Methodology

For the purpose of this study 30 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 30 subjects who were grouped purposively into two groups (15 each). The first group 15 subjects were considered as control group and second 15 subjects were considered as experimental group.

Control Group	O1		O2
Pranayama Group	O3	T1	O4

O = Observation, T = Treatment

Forced expiratory volume was measured by pulmonary function test or Total lungs function test and scores was recorded in liters. The experiment group was taken 6 weeks Pranayama training, in this training program only Pranayama (Kapalbhati Pranayam, Anulom-Vilom Pranayam, Ujjayi Pranayam, Bhramari Pranayam & Bhastrika Pranayam) performed by 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

Testing basic Assumption to apply ANCOVA (Chan, Y. H., 2003)

Testing Normality of data by Q-Q Plots

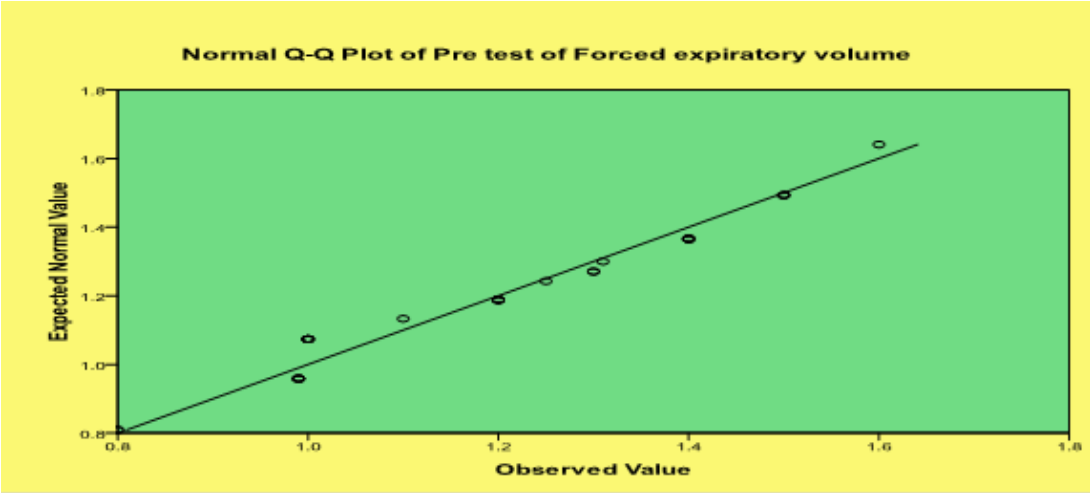

Fig 1

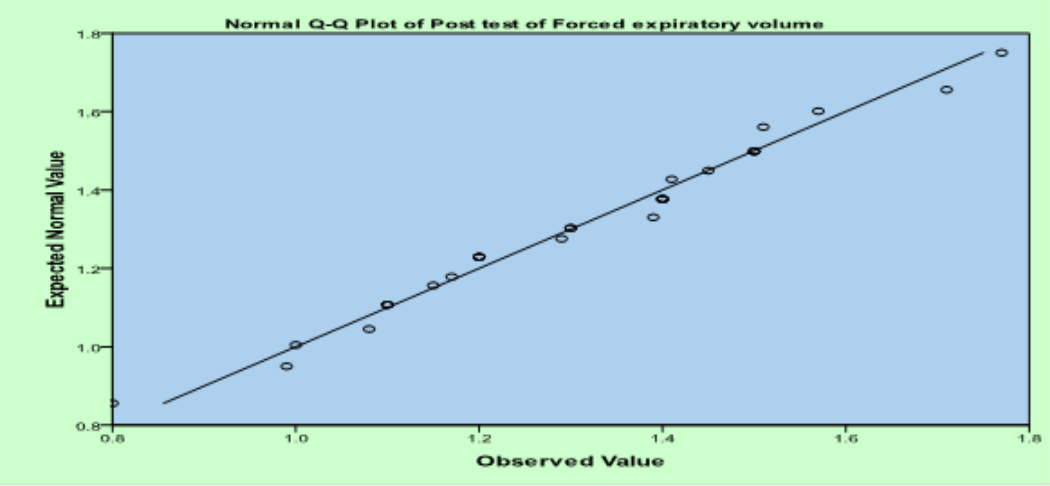

Fig 2

The Q.Q Plot compares the quantities of a data distribution with the quintiles of a standardized theoretical distribution from a specified family of distributions (in this case, the normal distribution). In the above Q.Q. plots, the points are plotted along a line. The Q.Q. plots also verify that the distribution is normal.

Testing Normality of data by Normal Curve with histogram

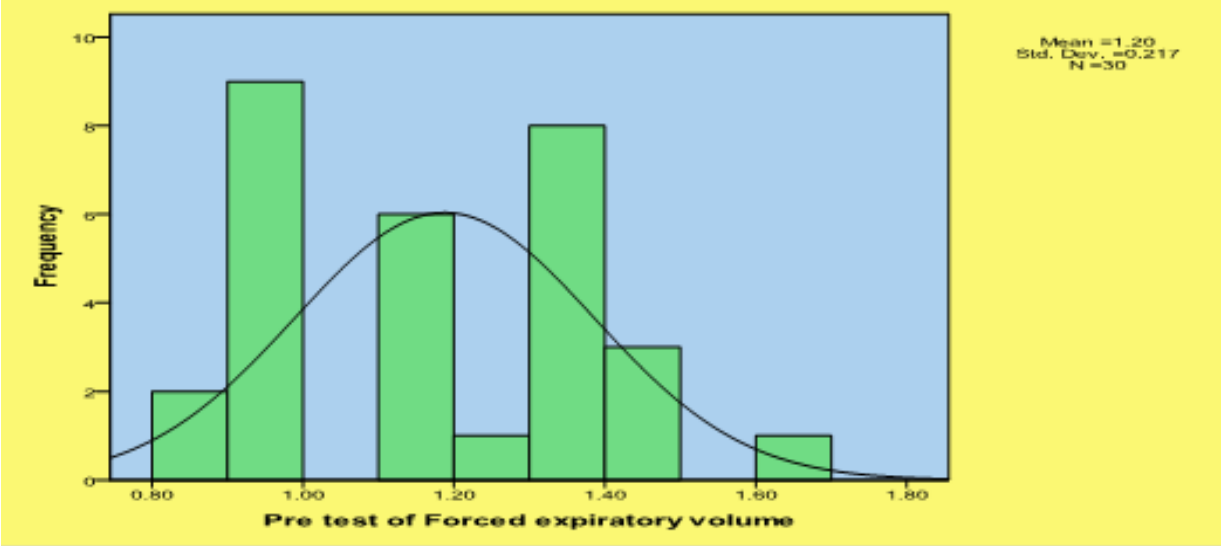

Fig 3

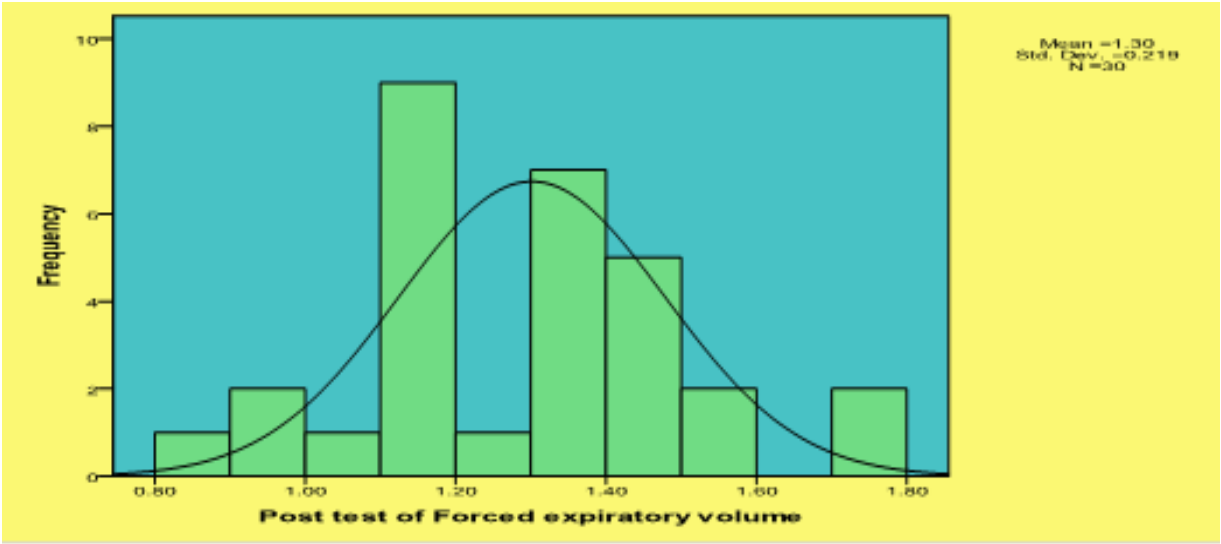

Fig 4

Histogram with normal curve belonging Pre and Post of force vital capacity satisfies the normal distribution of data.

Testing Normality of data by formal Test

Levene's Test of Equality of Error Variances[a]			
Dependent Variable :Post test			
F	df1	df2	Sig.
3.348	1	28	.078
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			
a. Design: Intercept + Pre test of Forced expiratory volume + Group			

The formal test named levene's statistic test were also applied to conform normality of data. Forced expiratory volume scores, the variances were no significant different in the two group, levene's statistic value (1, 28) = 3.348, p<0.078, shows

that the distribution is normal. It can be confident that population variances for each group are approximately equal and distribution is normal.

Since data fulfils basic assumptions to apply analysis of covariance was applied to find out effect of 6 weeks of Pranayama on Forced expiratory volume of person with COPD.

Table 1: Descriptive Statistics of Experimental and Control group in relation to Forced expiratory volume

		N	Mean	Std. Dev	Std. Error	Minimum	Maximum
Pre test	Control	15	1.1987	.21517	.05556	.80	1.50
	Experimental	15	1.1960	.22718	.05866	.80	1.60
	Total	30	1.1973	.21741	.03969	.80	1.60
Post test	Control	15	1.2160	.20750	.05358	.80	1.50
	Experimental	15	1.3900	.20046	.05176	1.08	1.77
	Total	30	1.3030	.21912	.04001	.80	1.77

Table 1 clearly indicates that the mean and standard deviations of Forced expiratory volume at control and Pranayama group. The observed mean and standard deviation of pre test, Forced expiratory volume of control group 1.19±0.21 & Pranayama group 1.19±0.22; and Post test, Forced expiratory volume of control group 1.21±0.20 & Pranayama group 1.39±0.20 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 Pranayamaa and control group in relation to Forced expiratory volume. The results are presented in the table no 2.

Table 2: Analysis of Variance of Comparison of Means of Pranayama and Control Group in relation to Forced expiratory volume

		Sum of Squares	df	Mean Square	F	Sig.
Pre test	Between Groups	.000	1	.000	.001	.974
	Within Groups	1.371	28	.049		
	Total	1.371	29			
Post test	Between Groups	.227	1	.227	5.456	.027
	Within Groups	1.165	28	.042		
	Total	1.392	29			

Table 2 revealed that, the pre test obtained 'F' value of .001 is found to be no significant at .05 level, which is clearly indicated that there are no significant difference and explains the random assignment of subjects to Pranayama and control group is quite successful. In relation to post test, significant difference is found among Pranayama group and control group pertaining to Forced expiratory volume, since obtained 'F' value of 5.456 is found significant at .05 level.

Table 3: Adjusted post test means of Pranayama group and control group in relation to Forced expiratory volume

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Control	1.215[a]	.014	1.187	1.243
Experimental	1.391[a]	.014	1.363	1.419
a. Covariates appearing in the model are evaluated at the following values: Pre test = 1.1973.				

From the table 3, it is revealed that mean of control group is 1.215 with the standard error of 0.014 and mean of Pranayama group is 1.391 with the standard error of 0.014. The data are analyzed and the results pertaining to analysis of co-variance of Pranayama group and control group of COPD person in relation to Forced expiratory volume 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 Pranayama group and Control Group in relation to Forced expiratory volume

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	.233	1	.233	85.178	.000
Error	.074	27	.003		

Table 4 revealed that, the obtained 'F' value of 85.178 is found significant at .05 levels. This result indicates that the treatment (Pranayama) is given to subjects has increase Forced expiratory volume of subjects.

The Graphical representation of mean plot of Pranayama group and control group in relation to Forced expiratory volume is presented with the help of figure 5.

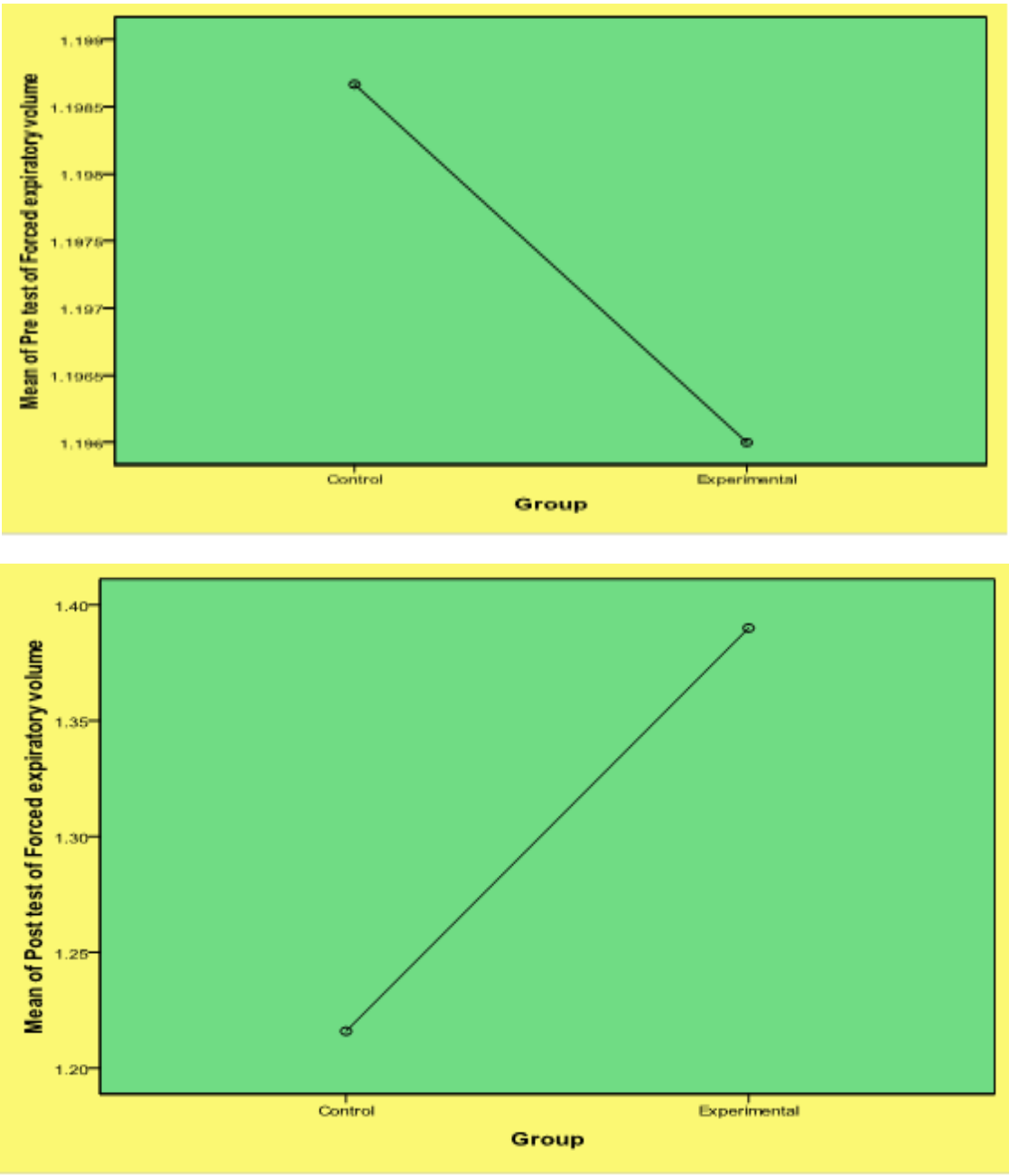

Fig 5: The Graphical representation of mean plot of Pranayama group and control group in relation to Forced expiratory volume

Discussion of Findings

In the beginning stages of Pranayama, there should be no retention of the breath, but only deep inhalation and exhalation. The Prana has first to be brought to accept the conditions that are going to be imposed on it, and hence any attempt to practice retention should be avoided. In place of the quick breathing that we do daily, a slow breathing should be substituted, and instead of the usually shallow breathing, deep breathing should be practiced, gradually. Vexed minds breathe with an unsymmetrical flow. Submerged worries are likely to disturb Pranayama. One may be doing one's functions like office-going, daily, and yet be calm in mind. But another may do nothing and be highly nervous, worried and sunk in sorrow.

In this present study, there is significant effect of Pranayama on forced expiratory volume. The pulmonary function tests before and after 6 weeks of Pranayama was assessed. Forced expiratory volume (FRV1) is found significantly improved after 6 weeks of Pranayama exercises. This indicates that there is some degree of broncho-dilatation, which is leading to better oxygenation of the alveoli. Endurance power of the lungs also improved as shown by improvement in maximum voluntary ventilation. Improvement in PFTs in the study could be because of reduction of sympathetic reactivity attained with Pranayama training. This may allow bronchio-dilatation by correcting the ab-normal breathing patterns and reducing the muscle tone of inspiratory and expiratory muscles. Due to improved breathing patterns, respiratory bronchioles may be widened and perfusion of a large number of alveoli can be carried out efficiently. In response to variations in breathing

patterns a number of central and autonomic nervous system mechanisms as well as mechanical (heart) and hemodynamic adjustments are also triggered, thereby causing both tonic and phasic change in cardiovascular functioning. Hence, it can be said that Pranayama breathing may prevent serious cardio-respiratory complications by emphasizing optimal physical and mental conditioning. The result of the study is in consonance with the findings of Sud Sushant Sud Khyati S (2013), The benefits includes the prolongation of breath holding time, increase in PEFR (Peak Expiratory Flow Rate), FVC (Forced Vital Capacity), FEV1 (Forced Vital capacity in 1 second), MVV (Maximum Voluntary Ventilation) and lowered respiratory rate. Patients of chronic lung diseases like Asthma, Bronchitis, Emphysema, COPD, etc. may derive immense benefits from these changes in pulmonary functions.

Conclusions

It is concluded that there is significant effect of Pranayama on forced expiratory volume of person with chronic obstructive pulmonary disease.

Practical Applications

The results of this study provide insight Pranayama for improvement of forced expiratory volume 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 Pranayama.

References

1. Prentice William E. Therapeutic modalities for Physical Therapists. McGraw Hill medical publication, New York, 2002.
2. Prentice William E. Therapeutic Modalities for Sports Medicine and Athletic Training. McGraw-Hill publication, New York, 2009.
3. Saraswati Swami Niranjanananda. Prana and Pranayama. Yoga Publications Trust, Munger, Bihar, India, 2009.
4. Sivananda Swami. Practical Lessons in Yoga. A Divine Life Society Publication. Tehri-Garhwal, Uttaranchal, 1997.
5. Waller Derek G, Sampson Anthony P, Renwick Andrew G, Hillier Keith. Medical Pharmacology & Therapeutics. Elsevier Ltd., China, 2014.
6. Wörle Luise, Pfeiff Erik. Yoga as Therapeutic Exercise; A Practical Guide for Manual Therapists. Elsevier Ltd., China, 2010.
7. Birdee Gurjeet S, Legedza Anna T, Saper Robert B, Bertisch Suzanne M, Eisenberg David M, Phillips Russell S. Characteristics of Yoga Users: Results of a National Survey. Journal of General Internal Medicine. 2008; 23(10):1653-1658.
8. BR Celli. Pulmonary rehabilitation in patients with COPD. American Journal of Respiratory and Critical Care Medicine. 1995; 152(3):861-4.
9. CR Borge, KB Hagen, AM Mengshoel E, Omenaas T, Moum, Wahl AK. Effects of controlled breathing exercises and respiratory muscle training in people with chronic obstructive pulmonary disease: results from evaluating the quality of evidence in systematic reviews. BMC Pulmonary Medicine. 2014; 14(1):184.
10. Donesky D, Melendez M, Nguyen HQ, Carrieri-Kohlman V. A responder analysis of the effects of yoga for individuals with COPD: who benefits and how?. International Journal of Yoga Therapy. 2012;(22):23-36.
11. Donesky-Cuenco D, Nguyen HQ, Paul S, Carrieri-Kohlman V. Yoga therapy decreases dyspnea-related distress and improves functional performance in people with chronic obstructive pulmonary disease: a pilot study. Journal of Alternative and Complementary Medicine. 2009; 15(3):225-34.
12. DV de Godoy, RL Bringhenti, A Severa R, de Gasperi LV Poli. Yoga versus aerobic activity: effects on spirometry results and maximal inspiratory pressure. Journal of Brasileira de Pneumologia. 2006; 32(2):130-5.
13. Beekman E, Mesters I, Hendriks EJ, Muris JW, Wesseling G, Evers SM, *ET AL*. Exacerbations in patients with chronic obstructive pulmonary disease receiving physical therapy: a cohort-nested randomised controlled trial. BMC Pulmonary Medicine. 2014; 14:71.
14. ÉKh Akhmetzianova VV, Gaĭnitdinova AB, Bakirov OA, Bogoroditskaia Timershina IR. Effect of ivabradine on pulmonary hypertension in chronic obstructive pulmonary disease. Kardiologiia. 2012; 52(2):41-6.
15. Dyer F, Callaghan J, Cheema K, Bott J. Ambulatory oxygen improves the effectiveness of pulmonary rehabilitation in selected patients with chronic obstructive pulmonary disease. Chronic Respiratory Disease. 2012; 9(2):83-91.
16. Chen G, Zhou X, Hu X, Liu Y, Li Q. Effect of exercise on the quality of life and pulmonary function in patients with chronic obstructive pulmonary disease. Respiration. 2011; 36(7):682-6.
17. Hilbert G, Gruson D, Gbikpi-Benissan G, Cardinaud JP. Sequential use of noninvasive pressure support ventilation for acute exacerbations of COPD. Intensive Care Medicine. 1997; 23(9):955-61.
18. Demeyer H, Burtin C, Van Remoortel H, Hornikx M, Langer D, Decramer M, et AL. Standardizing the analysis of physical activity in patients with COPD following a pulmonary rehabilitation program. Chest. 2014; 146(2):318-27.
19. Harinath K, Malhotra AS, Pal K, Prasad R, Kumar R, Kain TC, Rai L, Sawhney RC. Effects of Hatha yoga and Omkar meditation on cardiorespiratory performance, psychologic profile, and melatonin secretion. Journal of Alternative and Complementary Medicine. 2004; 10(2):261-8.
20. Hill K, Holland AE. Strategies to enhance the benefits of exercise training in the respiratory patient. Clinics in Chest Medicine. 2014; 35(2):323-36.
21. Cameron-Tucker HL, Wood-Baker R, Owen C, Joseph L, Walters EH. Chronic disease self-management and exercise in COPD as pulmonary rehabilitation: a randomized controlled trial. International Journal of Chronic Obstructive Pulmonary Diseases. 2014; 9:513-23.
22. Holland AE, Hill CJ, Jones AY, McDonald CF. Breathing exercises for chronic obstructive pulmonary disease. The Cochrane Database of Systematic Reviews. 2012; 10:CD008250.

23. Gaunaurd IA, Gómez-Marín OW, Ramos CF, Sol CM, Cohen, Cahalin LP, *et al*. Physical activity and quality of life improvements of patients with idiopathic pulmonary fibrosis completing a pulmonary rehabilitation program. Respiratory Care, 2014.
24. Singh S, Tripathi JS. Effect of 6 weeks of pranayama on force vital capacity of person with chronic obstructive pulmonary disease. International Journal of Physical Education and Sports. 2017; 2(3):04-10.
25. Singh S, Tripathi JS, Reddy TO. Effect of yogic practices and therapeutic exercise on force vital capacity of person with chronic obstructive pulmonary disease. International Journal of Applied Research. 2016; 2(11):164-168.