Original Research Paper

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A STUDY TO ASSESS THE EFFECT OF SHORT – TERM YOGA ON LUNG FUNCTION AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ATTENDING OPD OF SELECTED HOSPITAL, BURDWAN, WEST BENGAL

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ABSTRACT

Background & Objectives: Yoga, an ancient Indian science as well as way of life, improves Pulmonary function when practiced regularly for a certain period. A pre experimental study was Conducted to assess the effect of short-term yoga on lung function among patients with Chronic Obstructive Pulmonary Disease (COPD) attending OPD of selected hospital, Burdwan, West Bengal. The objective of the study was to assess the selected parameters of lung function of patients with COPD before and after the Intervention of yoga. To find the association of effect of yoga with the selected demographic variables of the patients. To evaluate the efficacy of short-term yoga in terms of improvement of lung function of the patients with COPD.

Methods: The study was conducted with 50 study subjects selected by purposive sampling technique . A semi-structured interview schedule was prepared for recording the data of demographic variables. A standardized tool that is COPD Assessment Tool (CAT) was used to categorize the patients. Yoga and breathing exercises, were selected by Yogic expert , Conceptual framework was based on System model. Baseline assessment and post intervention lung function assessment was performed by calibrated computerized Spirometer & re-enforcement were performed at 7 days interval up to 21 days.

Results: The result revealed that a significant improvement FVC {"t" value 6.756 at (df 49), p<0.001} ,FEV1 {"t" value 7.409 at (df 49), p<0.001}, FEV1/FVC {"t" value 4.747 at df (49) p<0.001 } ,FEF 25%-75% {"t" value 5.085 at (df 49), p<0.001} . PEFR {"t" value 8.761 at (df 49), p<0.001}, MVV {"t" value 7.409 (df 49), p<0.001}. Chi square test for association with improvement of lung function and the selected demographic variables shows significant association in age and gender with FEV1 and MVV, Gender and FEF25%-75%.

Interpretation & Conclusion: It is concluded that Short–term yoga practice are effective in improving lung function among COPD patients.

KEYWORDS : Short –term Yoga , Chronic Obstructive Pulmonary Disease , Lung Function

1. INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is an important cause of morbidity and mortality and poses a major public health problem. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) management includes reduction in symptoms, complication , exacerbations and mortality, improvement of exercise tolerance, health status . Recent evidence-based clinical practice guidelines and statements prove in management of COPD, pulmonary rehabilitation is widely accepted as the most effective non-pharmacotherapy. Research have indicated that various exercises such as upper extremities exercises, Tai-Chi and Yoga training can relieve dyspnoea, improve lung function and quality of life of COPD patients.. Despite of many research works , still ample scopes remained for further studies because lots of improvement can be done to the COPD patients for upliftment of their living conditions. Yoga can be utilized by its therapeutic effects in addition to its complementary and alternative medicine role. Considering current high speed and high tech era – there is definitely a need of search for some short duration yoga practice in contrast to prolong period to achieve optimum desired effect from yoga. These idea guides the investigator to choose the short term effect of yoga on COPD. Yoga regimen was found to improve lung functions and cardiovascular functions and rehabilitation [1,2,4].Yoga-based pulmonary rehabilitation for the management of dyspnoea in coal miners with Chronic Obstructive Pulmonary Disease [3]. Yoga practice can be advocated to improve respiratory efficiency, raise energy level and calm the body for healthy individuals as well as an alternate therapy or as adjustments conventional therapy in respiratory diseases [5, 8]. Thus Yoga breathing exercises used adjunct with standard pharmacological treatment significantly improve pulmonary functions in patients with bronchial asthma and COPD [6,9]. Yoga can be beneficial in the prevention and cure of diseases[7]. Pranayama release undue tension, adaption of regulatory mechanism and acclimatization , beneficial to Respiratory System, gives a balance and integrate structure and functional unit of the body of healthy and diseased individual [10,11,12]. Yogic breathing causes improvement in psychological function , better coping mechanism [13,14]. Yoga practices improve functional capacity, physical health, mental health , promote recovery from addiction [15,16,17,18,19]

2. MATERIALS AND METHODS

2.1 Subject

Both male and female sex are considered as study subject from the patients attending OPD with mild and moderate Chronic Obstructive Pulmonary Disease selected by CAT (Chronic Obstructive Pulmonary Disease Assessment Tool) score.

2.2 Inclusion criteria

Male and female COPD patient , aged 35 -60 years , without any history of severe medical, surgical, psychiatric illness , selected by CAT scoring who provide informed consent and willing to participate and complete all study assessment were included in the study.

2.3 Exclusion criteria

Patient with history of severe asthma , severe COPD , severe heart disease , active tuberculosis , major abdominal surgery and not willing to participate the study were excluded.

2.4 Ethical clearance and informed consent

The research study was approved by Institutional Ethics Committee, Burdwan Medical College and hospital, Burdwan and has got permission from Department of health and family Welfare, Government of West Bengal. All procedures were performed after making the participants fully informed about the study and getting written informed consent as per guideline.

2.5 Study design

The research design depicts the overall plan for organizing a scientific and systematic investigation. The design selected for this study was One group Pre-test Post-Test Design. Purposive sampling technique is done .Sample size of 50 was arbitrarily divided into six group. Each group underwent a baseline or pretest recording of PFT (FVC, FEV_1, FEV_1/FVC, FEF25% -75% ,PEFR, MVV). After the pretest recording each group underwent Yoga regimen for 21 days and PFT recording on day seven, fourteen and twenty one. Each patient was on conventional management.

2.6 Tools and technique

An expert validated Semi structured questionnaire with reliability value 1 and standardized CAT Scoring tool , developed by a multidisciplinary group of international experts, was used to collect demographic data by interviewing and questioning technique. Short –term yoga regimen for 21 days in form of training and reinforcement of Free hand exercise, breathing exercise and yoga was followed. To assess the effect of yoga on lung function of COPD patient , calibrated computerized Spiro meter was used before and after yoga regimen on 7^{th}, 14^{th}, 21st day. Reliability of the tool was established by testing the lung function of COPD patients of Chest OPD . Rank order method was used to calculate the correlation coefficient. The 'r' value obtained is 0.83.

2.7 Intervention

The COPD patients was identified as purposive code from chest OPD at Burdwan Medical College and Hospital. The patients were made to

understand about Yoga . A combination of freehand movement, asanas and breathing exercise are included in yoga regimen and followed for 21 days. A Pre-test 1st observation computerized Spiro metry followed by three consecutive observation on day seven, fourteen and twenty one were performed.

3 RESULTS

3.1 Demographic data

Majority of study subjects were within 45-55 years (48%), male gender 82%, illiterate 52% , family income 2000-5000/(64%), agriculture and food grain worker 60%, history of Asthma 48%, ex-smoker 36% and no history of alcoholism 54%, tobacco chewing 68%. No history of major surgery and psychiatric illness.

3.2 Changes of lung function in association with demographic variables

There are significant association of improved FEV_1 parameter of lung function and age and gender ($p<0.05$), $FEF_{25\%-75\%}$ parameter of lung function and gender ($p<0.05$) , MVV parameter of lung function and age and gender ($p<0.05$)

3.3 Efficacy of short-term yoga on lung function

Table 1 Paired 't' test for pre and post test of FVC value, before and after the practice of yoga of study subjects for 21 days .

n=50

Parameters of lung function test	Mean	Mean Difference	SD	"t" value
FVC Pre test VC postTest	2.230 2.707	0.477	0.715 0.661	6.756

't'(df_{49}) =2.009 , $p<0.05$ (df_{49}) = 3.5004 , $p<0.001$

The data presented in table 1 showed that mean post test lung function score (2.707) was higher than the mean pre test lung function score (2.230) of FVC value in lung function with the mean difference of 0.476. The obtained mean difference was found to be statistically highly significant as evident from "t" value of 6.756 for (df49) at 0.05 level of significance.

Table 2 Paired 't' test for pre and post test of FEV1 value, before and after the practice of yoga of the study subjects for 21 days.

n=50

Parameters of Lung function test	Mean	Mean difference	SD	"t" value
FEV_1Pretest FEV_1posttest	1.342 1.889	0.547	0.668 0.761	7.409

't'(df_{49}) =2.009 , $p<0.05$ (df_{49}) = 3.5004 , $p<0.001$

Table 2 showed that mean post test lung function score (1.889) was higher than the mean pre test lung function score (1.342) of FEV_1 value in lung function with the mean difference of 0.547. The obtained mean difference was found to be statistically highly significant as evident from "t" value of 7.409 for (df_{49}) at 0.05 level of significance.

Table 3 Paired 't' test for pre and post test of FEV1/FVC value, before and after the practice of yoga of the study subjects for 21 days.

n=50

Parameters of Lung function test	Mean	Mean Difference	SD	"t"value
FEV1/FVC Pretest FEV1/FVC posttest	57.94 68.33	10.39	16.39 14.43	4.74

't'(df_{49}) =2.009 , $p<0.05$ (df_{49}) = 3.5004 , $p<0.001$

The result of paired "t" test depicts that there is significant improvement of Post test mean score (68.33) than pre test mean score (57.94) with the mean difference 10.39. The obtained mean difference was found to be statistically highly significant as evident from "t" value of 4.747 for (df49) at 0.05 level of significance.

Table 4 Paired 't' test for pre and post test of $FEF_{25\%-75\%}$ value of lung function, before and after the practice of yoga for 21 days.

Parameters of Lung function test	Mean	Mean difference	SD	"t"value
$FEF_{25\%-75\%}$Pre Test $FEF_{25\%-75\%}$ Post Test	0.947 1.650	0.702	0.685 1.239	5.085

't'(df_{49}) =2.009 , $p<0.05$ (df_{49}) = 3.5004 , $p<0.001$

The data presented in table 4 showed that mean post test lung function score (1.650) of $FEF_{25\%-75\%}$ value is higher than the mean pre test lung function score (0.947) with the mean difference of 0.702. The obtained mean difference was found to be statistically highly significant as evident from "t" value of 5.085 for (df_{49}) at 0.05 level of significance.

Table 5 Paired 't' test for pre and post test of PEFR value, before and after the practice of yoga for 21 days of the study subjects

n=50

Parameters of Lung function test	Mean	Mean difference	SD	"t"value
PEFR Pretest PEFR posttest	3.01 4.800	1.79	1.613 2.009	8.761

't'(df_{49}) =2.009 , $p<0.05$ (df_{49}) = 3.5004 , $p<0.001$

The result of paired "t" test depicts that there is significant improvement of PEFR value . The post test mean score (4.800) is higher than pre test mean score(3.010) with the mean difference 1.790. The calculated value of 't'(df 49) is 8.761 at 0.05 level of significance, is more than tabulated "t" (df 49) value .

Table 6 Paired 't' test for pre and post test of MVV value, before and after the practice of yoga for 21 days of the study subject

n=50

Parameters of Lung function test	Mean	Mean difference	SD	"t" value
MVV Pretest MVV posttest	53.68 75.56	21.88	26.72 30.46	7.40

't'(df_{49}) =2.009 , $p<0.05$ (df_{49}) = 3.5004 , $p<0.001$

Data presented in table 6 showed that mean post test lung function score (75.56) of MVV value is higher than the mean pre test lung function score (53.68) with the mean difference of 21.88. The obtained mean difference was found to be statistically highly significant as evident from "t" value of 7.40 for (df_{49}) at 0.05 level of significance.

4. DISCUSSION

Yoga is an ancient Indian way of life , which includes changes in mental attitude, diet and the practice of specific techniques such as Yoga asanas and breathing exercise attend the highest level of consciousness, When a person practices yoga there is muscular relaxation , development and improved blood supply to lung tissue , increase autonomic nervous system functions inform of inflatory and deflatory lung reflexes – all these collectively improve the entire respiratory performances. Yoga posture involve isometric contraction of inspiratory and expiratory muscles of lung and thus improve Vital Capacity. Breathing exercise causes contraction of abdominal and diaphragmatic muscles and remove secretion from bronchial tree and hence improve Forced Expiratory volume and PEFR. This is supported by the following studies similar studies .

A study by Vitthal Khode and A Mooventhan (2014) regarding the effect of pranayama on pulmonary function it is showed a significant increase in Slow vital capacity (SVC) in Peak Expiratory Flow (PEF), Forced Expiratory Flow $_{25\%}$(FEF $_{25\%}$, Maximum voluntary Ventilation (MVV) and significant reduction in weight in subject group compared with control group. But no significant changes was found in Forced Vital Capacity (FVC) in both subject group and control group. Significant increase in Forced Expiratory Volume $_1$ ($FEV_{1)}$ and insignificant increase in FEV_1/FVC were observed in subject group but in control group insignificant reduction were observed [20]. A study by Kadu P.P. and Deshpande V.K (2013) on 90 middle aged human to evaluate the effect of yogic exercise on respiratory system. Under supervision of yogic expert 6 month yoga reveal improvement in different parameter of lung function. A significant increase was noted in Forced Vital Capacity (FVC) , Forced Expiratory Volume $_1$ ($FEV_{1)}$, Peak Expiratory Flow Rate (PEFR), FEV1/FVC ratio in study group. These prove respiratory efficiency significantly improve following regular long term yogic exercise [21]. A randomised control study by S K Katiyar and Shailesh Bihari (2006) reveals the effect of pranayama on COPD patient considering Pulmonary Function Test (PFT), Blood Gas Analysis and 6 minutes walk test . The study demonstrated that in patient with significant COPD if specially trained for Yogic breathing, there is improvement of lung function parameters,

improvement in the exercise tolerance and usual activity and reduction on the impact of disease. There were significant improvement only in Peak Expiratory Flow Rate (PEFR), a small but insignificant increase in FEV_1 and FVC. There is no significant changes in blood gas values though a small but significant increase in value of 6 minutes walk test [13]. In a randomized control trial study by P A Balaji, Smitha R Varne and Syed Sadat Ali (2012) on physiological effects of yogic practice and transcendental meditation in health and disease describe that in yoga group, compared with control group, showed greater improvement in Peak Flow Rate , Decrease attacks of Asthma, following two weeks of yoga practice. Yoga training produce statistically significant increase in FEV, FEV_1, Peak Expiratory Flow Rate. So there is overall improvement in respiratory function [17]. In a study of Dr. Vinayak, P, Doijad, Dr Anil , Dr Surdi (2012) on Effect of short-term yoga practice on pulmonary function test reveals that there is significant increase in FVC, FEV_1 , MVV , PEFR following twelve weeks of yoga practice among sixty MBBS students aged eighteen to twenty years [5]. The findings of the present study reveals that . A yogic exercise schedule of 21 days on 50 study subjects with age group 35-60 years of COPD patients , there is improvement of all taken parameters in lung function. Yogic practice in normal subject lead to improvement in respiratory function through body and breath control including relaxation technique. The significant increase in said parameter may indicate that Yoga practice can be an important rehabilitation method following COPD medical therapy .Further study with the more number of sample size and longer duration yoga schedule is required in this regard.

5. CONCLUSION

Based on the scientific evidence the present study concludes that yoga exercise is effective in improvement of lung function of mild and moderate COPD patients. Thus the potential problem of lung function of COPD patients can be improved through regular exercise of yoga in addition to their medical treatment.

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