Original Research Paper

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Physical Education

YOGA TRAINING IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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ABSTRACT Breathing capacity and activity limitation are characteristic features of chronic obstructive pulmonary disease (COPD). Exercise intolerance may result from ventilatory limitation, car-diovascular impairment, and/or skeletal muscle dysfunction. yoga training, a core component of pulmonary rehabilitation, improves the lung capacity (endurance and, to a lesser degree, maximal work capacity) of patients with COPD in spite of the irreversible abnormalities in lung function. Dyspnea and health-related quality of life also improve following pulmonary rehabilitation. The clinical benefits of yoga rehabilitation last up to 2 years following 12 weeks of training. Existing evi-dence-based guidelines recommend that exercise training/pul-monary rehabilitation be included routinely in the management of patients with moderate to severe COPD. Yoga training/ pulmonary rehabilitation may be undertaken in an inpatient, out-patient, or home-based setting, depending on the individual needs of the patient and available resources. The type and inten-sity of training and muscle groups trained determine the expected outcomes of exercise training. Both high- and low-intensity exercise lead to increased exercise endurance, but only high-intensity training also leads to physiologic gains in yoga fitness. The rationale for and outcomes of yoga training, as well as ventilatory muscle training, are reviewed, and discussed.

KEYWORDS : chronic obstructive pulmonary disease, endurance, yoga, pulmonary rehabilitation, skeletal muscle, strength.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity, mortality, and health care use [1]. COPD -Chronic obstructive pulmonary Disease (COPD),a common preventable and treatable disease , is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to the noxious particles or gases. Exacerabation and comorbidities contribute to the overall severity in individual patient.COPD is a leading cause of morbidity and mortality worldwide and results in an economic and social burden that is both substantial and increasing.About 3 million die due to COPD every year.In India median prevalence of COPD is 5% in men and 2.7% in women and about half a million people die due to Most cases of COPD can be prevented by reducing exposure to risk factors.]This includes decreasing rates of smoking and improving indoor and outdoor air quality. While treatment can slow worsening, there is no cure. COPD treatments include stopping smoking, vaccinations, respiratory rehabilitation, and often inhaled bronchodilators and steroids. Some people may benefit from long-term oxygen therapy or lung transplantation. In those who have periods of acute worsening, increased use of medications and hospitalization may be needed.

As of 2015 COPD affects about 174.5 million (2.4%) of the global population. It typically occurs in people over the age of 40. Males and females are affected equally commonly. In 2015 it resulted in 3.2 million deaths, up from 2.4 million deaths in 1990. More than 90% of these deaths occur in the developing world. The number of deaths is projected to increase further because of higher smoking rates in the developing world, and an aging population in many countries. It resulted in an estimated economic cost of $2.1 trillion in 2010.

COPD in India.

SIGNS AND SYMPTOMS

Wheezing The sound of wheezing as heard with a stethoscope.

The most common symptoms of COPD are sputum production, shortness of breath, and a productive cough. These symptoms are present for a prolonged period of time and typically worsen over time. It is unclear if different types of COPD exist. While previously divided into emphysema and chronic bronchitis, emphysema is only a description of lung changes rather than a disease itself, and chronic bronchitis is simply a descriptor of symptoms that may or may not occur with COPD.

Cough

A chronic cough is often the first symptom to develop. When it persists for more than three months each year for at least two years, in combination with sputum production and without another explanation, there is by definition chronic bronchitis. This condition can occur before COPD fully develops. The amount of sputum produced can change over hours to days. In some cases, the cough may not be present or may only occur occasionally and may not be productive. Some people with COPD attribute the symptoms to a "smoker's cough". Sputum may be swallowed or spat out, depending often on social and cultural factors. Vigorous coughing may lead to rib fractures or a brief loss of consciousness. Those with COPD often have a history of "common colds" that last a long time.

Shortness of breath

Shortness of breath is often the symptom that most bothers people. It is commonly described as: "my breathing requires effort," "I feel out of breath," or "I can't get enough air in". Different terms, however, may be used in different cultures. Typically the shortness of breath is worse on exertion of a prolonged duration and worsens over time. In the advanced stages, it occurs during rest and may be always present. It is a source of both anxiety and a poor quality of life in those with COPD. Many people with more advanced COPD breathe through pursed lips and this action can improve shortness of breath in some.

Other features

In COPD, it may take longer to breathe out than to breathe in. Chest tightness may occur but is not common and may be caused by another problem. Those with obstructed airflow may have wheezing or decreased sounds with air entry on examination of the chest with a stethoscope. A barrel chest is a characteristic sign of COPD, but is relatively uncommon. Tripod positioning may occur as the disease worsens.

Advanced COPD leads to high pressure on the lung arteries, which strains the right ventricle of the heart. This situation is referred to as cor pulmonale, and leads to symptoms of leg swelling and bulging neck veins. COPD is more common than any other lung disease as a cause of corpulmonale. Cor pulmonale has become less common since the use of supplemental oxygen.

Cause

The primary cause of COPD is tobacco smoke, with occupational exposure and pollution from indoor fires being significant causes in some countries. Typically these exposures must occur over several decades before symptoms develop. A person's genetic makeup also

affects the risk.

1.3 DIAGNOSTIC METHOD

A person blowing into a spirometer. Smaller handheld devices are available for office use.

The diagnosis of COPD should be considered in anyone over the age of 35 to 40 who has shortness of breath, a chronic cough, sputum production, or frequent winter colds and a history of exposure to risk factors for the disease. Spirometry is then used to confirm the diagnosis.Screening those without symptoms is not recommended.

Spirometry

Spirometry measures the amount of airflow obstruction present and is generally carried out after the use of a bronchodilator, a medication to open up the airways. Two main components are measured to make the diagnosis: the forced expiratory volume in one second (FEV1), which is the greatest volume of air that can be breathed out in the first second of a breath, and the forced vital capacity (FVC), which is the greatest volume of air that can be breathed out in a single large breath. Normally, 75–80% of the FVC comes out in the first second and a FEV1/FVC ratio of less than 70% in someone with symptoms of COPD defines a person as having the disease. Based on these measurements, spirometry would lead to over-diagnosis of COPD in the elderly. The National Institute for Health and Care Excellence criteria additionally require a FEV1 of less than 80% of predicted.

Evidence for using spirometry among those without symptoms in an effort to diagnose the condition earlier is of uncertain effect and is therefore currently not recommended. A peak expiratory flow (the maximum speed of expiration), commonly used in asthma, is not sufficient for the diagnosis of COPD.

Severity

MRC shortness of breath scale	
Grade	**Activity affected**
1	Only strenuous activity
2	Vigorous walking
3	With normal walking
4	After a few minutes of walking
5	With changing clothing

GOLD grade	
Severity	**FEV1 % predicted**
Mild (GOLD 1)	≥80
Moderate (GOLD 2)	50–79
Severe (GOLD 3)	30–49
Very severe (GOLD 4)	<30

There are a number of methods to determine how much COPD is affecting a given individual. The modified British Medical Research Council questionnaire (mMRC) or the COPD assessment test (CAT) are simple questionnaires that may be used to determine the severity of symptoms. Scores on CAT range from 0–40 with the higher the score, the more severe the disease. Spirometry may help to determine the severity of airflow limitation. This is typically based on the FEV1 expressed as a percentage of the predicted "normal" for the person's age, gender, height and weight. Both the American and European guidelines recommended partly basing treatment recommendations on the FEV1. The GOLD guidelines suggest dividing people into four categories based on symptoms assessment and airflow limitation. Weight loss and muscle weakness, as well as the presence of other diseases, should also be taken into account.

Yoga therapy is a type of therapy that uses yoga postures, breathing exercises, meditation, and guided imagery to improve mental and physical health. The holistic focus of yoga therapy encourages the integration of mind, body, and spirit. Modern yoga therapy covers a broad range of therapeutic modalities, incorporating elements from both physical therapy and psychotherapy.

Practice and Benefits of Yoga Therapy

Yoga therapy is practiced in a wide range of formats. Physical therapists, for example, often implement yoga techniques in their delivery of massage and other treatments. Yoga therapy practice can resemble physical therapy, rehabilitative therapy, and/or psychoth erapy. Unlike a standard yoga class, yoga therapy sessions are typically conducted in one-on-one or small group settings. Yoga therapy can be provided as an adjunct therapy to complement other forms of treatment, or it can be used to directly treat a specific issue. Yoga techniques range from simple to advanced, and can be enjoyed by people of all ages.

Potential benefits from yoga therapy include stress reduction, psychological well-being, improved diet, and efficient functioning of bodily systems. A 2011 qualitative study from Inkanyiso: Journal of Humanities and Social Sciences examined the effects of yoga therapy on anxiety. The findings not only indicated that yoga therapy effectively reduced subjects' anxiety, but improvement across several dimensions of physical and mental health including physicality, relaxation, and mindfulness.

OBJECTIVES OF THE STUDY

- To determine the prevalence of ascertain factors related to COPD in and around Delhi, India.
- To Evaluate the following parameters in patients of COPD:
  a) High Sensitivity C Reactive Protein (hs CRP)
  b) PFT
  c) Six minutes walk test
  d) COPD quessioners

2. To Evaluate the correlation of these parameters with severity of disease and the rate of acute exacerbations of COPD

TABLE IV LIST OF ASANAS

POSITION	NAME OF THE YOGIC PRACTICE
Shatkarma	Jalneti Kapalbhati
Suryanamaskar	Suryanamaskar
Standing	Tadasana
	Ardhachakrasana
	katichakrasana
Supine	savasana,
	pawanmuktasana
Prone	bhujangasana,
	salabhasana
Kneeling	vajrasana
	uttanmandukasana
Long Sitting	gomukhasana
	vakrasana
pranayama	Nadi shodhan
	bhastrika
	bhramari
Meditation	om chanting

DESCRIPTION OF YOGA PRACTICE

Abbreviations: AACVPR = American Association of Cardio-

vascular and Pulmonary Rehabilitation, ADL = activity of daily living, ATS = American Thoracic Society, BTS = British Tho-racic Society, COPD = chronic obstructive pulmonary disease, CPET = cardiopulmonary exercise testing, CRQ = Chronic Respiratory Questionnaire, FEV1 = forced expiratory volume in 1 s, HR = heart rate, HRR = heart rate reserve, IGF-1 = insulin growth factor-1, 6MWD = minute walk distance, NMES = neu-romuscular electrical stimulation, NO = nitric oxide, PImax = maximal inspiratory pressure, PR = pulmonary rehabilitation, RV = right ventricle, VE = minute ventilation, VMT = ventilatory muscle training, VO2max = maximal oxygen consumption, Vt = tidal volume, Wmax = maximal work load.

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COLLECTION OF DATA

The data on selected dependent variables for pre-tests and post tests were collected two days before and after the training programme respectively. On the first day body composition, PFR, CRP, Six min walk test, COPD Quessionnaire was tested.

Patient number:_____
Date:_____

CLINICAL COPD QUESTIONNAIRE

Please circle the number of the response that best describes how you have been feeling during the past week.
(Only one response for each question).

On average, during the past week, how often did you feel:	never	hardly ever	a few times	several times	many times	a great many times	almost all the time
1. Short of breath at rest?	0	1	2	3	4	5	6
2. Short of breath doing physical activities?	0	1	2	3	4	5	6
3. Concerned about getting a cold or your breathing getting worse?	0	1	2	3	4	5	6
4. Depressed (down) because of your breathing problems?	0	1	2	3	4	5	6
In general, during the past week, how much of the time:							
5. Did you cough?	0	1	2	3	4	5	6
6. Did you produce phlegm?	0	1	2	3	4	5	6
On average, during the past week, how limited were you in these activities because of your breathing problems	not limited at all	very slightly limited	slightly limited	moderately limited	very limited	extremely limited	totally limited/ by trouble to do
7. Strenuous physical activities (such as climbing stairs, hurrying, doing sports)?	0	1	2	3	4	5	6
8. Moderate physical activities (such as walking, housework, carrying things)?	0	1	2	3	4	5	6
9. Daily activities at home (such as dressing, washing yourself)?	0	1	2	3	4	5	6
10. Social activities (such as talking, being with children, visiting friends/ relatives)?	0	1	2	3	4	5	6

EXPERIMENTAL DESIGN

The experimental design used for this study was pre and post test random group design involving sixty subjects, who were divided at random into two groups of thirty each. This study consisted of two experimental groups. Group I underwent medicinal management andGroup II underwent yogic practice. All the subjects were tested prior to and after the training on selected variables.

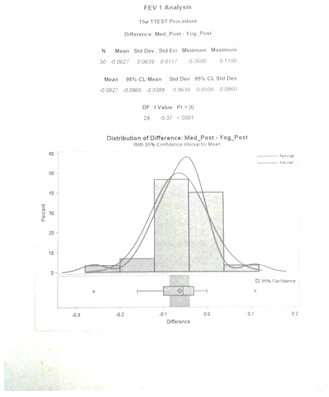
STATISTICAL TECHNIQUES

The data collected from the two groups before and after the experimental period were statistically examined for significant improvement by using analysis of variance. The data collected from the two groups before and after the experimental period were statistically examined for significant improvement by using analysis of variance. (Clarke and Clarke, 1972)

ANALYSIS OF DATA AND RESULTS OF THE STUDY

In this chapter, the analysis of the data and the results of the study are discussed. The purpose of the preset study is to find out the effect of yoga practices on COPD related parameters among the COPD patients. To achieve the purpose of this study, 60 COPD patients were selected at random. The age of the subjects ranged between 18 and 60 years. The selected subjects were divided into two experimental groups and a control group with thirty subjects in each (n=30). Experimental group I underwent medicinal management (PEG), Group II underwent yogic practice and medicinal management (YPG) for the training period of 12 weeks. Subjects of the two groups (PEG, YPG) were tested on selected criterion measures namely COPD related fit variables, general basic parameters and lipid profiles prior to and after the 12 weeks of the training period. The data pertaining to the variables in this study were statistically examined by using one way univariate analysis of variance (ANNOVA) for each variable separately, whenever 'F' ratio of adjusted post-test was found to be significant, the Scheffe's test was used as post-hoc test to determine the paired mean differences. The level of significance was fixed at 0.05.

PFT ANALYSIS ANNOVA



ANALYSIS OF VARIANCE FOR THE PRETEST AND POST TEST DATA ON CRP SCORE OF MEDICINAL MANAGEME NTGROUPANDYOGIC PRACTICES GROUPS Tests.

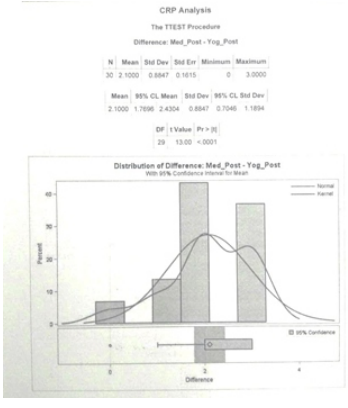
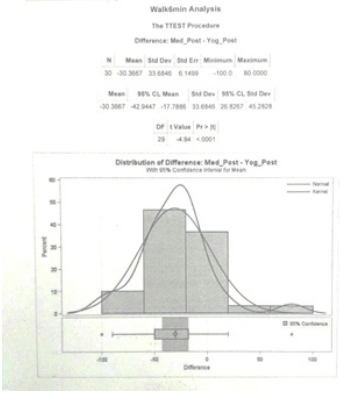


TABLE – XV ANALYSIS OF VARIANCE FOR THE PRETEST AND POST TEST DATA ON SIX MINUTE WALK TEST.



copd quessionaire ANALYSIS ANNOVA....

COPD Analysis

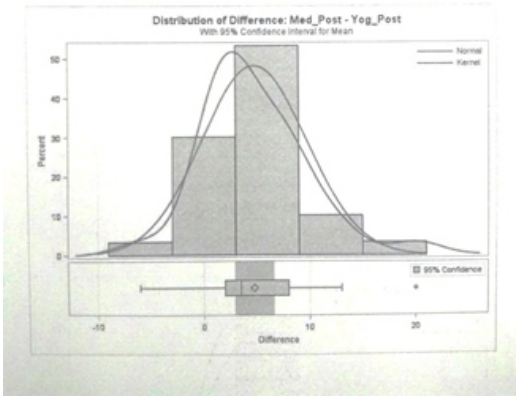
The TTEST Procedure

Difference: Med_Post - Yog_Post

N	Mean	Std Dev	Std Err	Minimum	Maximum
30	4.7667	4.9667	0.9068	-6.0000	20.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
4.7667	2.9121	6.6213	4.9667	3.9555	6.6768

DF	t Value	Pr > |t|
29	5.26	<.0001



SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

Our increased reliance on technology has substantially lessened work-related physical activity, as well as the energy expenditure required for activities of daily living. As a result, more time is available to pursue leisure activities. The unfortunate fact, however, are that many individuals do not engage in physical activity during their leisure time. Although the human body is designed for movement and strenuous physical activity, exercise is not a part of the average lifestyle. Exercise scientists and health/fitness professionals have maintained that regular physical activity is the best defense against the development of many diseases, disorders and illnesses. Primary goal of the exercise program is to develop and maintain cardio-respiratory fitness, prescribe aerobic activities using large muscle groups in a continuous, rhythmical fashion. In the initial and improvement stages of the exercise program, it is important to closely monitor the exercise intensity. In addition to walking, jogging and cycling, there are other exercise modalities that provide a sufficient cardio-respiratory demand for improving aerobic fitness. Indian philosophy of yoga also claims the role of such non-exercising technique 214 in improving the inner self and positive effects on various body functions. However, a comparative study of medicine and yoga and therefore, the present study was planned to see the effect of respective techniques on selected variables. The purpose of the present study was to findout the effect of yoga practices on COPD related fitness variables of COPD patients. To achieve the purpose of this study, a qualified physician examined 100 male Patients in chariatable clinic, in and around ashok vihar Delhi, India, and found out 60 COPD patients were selected at random, their age ranged from 18 to 60 years as per the official records. The selected subjects were divided into two experimental groups with thirty subjects in (n=30) each. Experimental group I underwent medicinal management (PEG), Group II underwent yogic practice (YPG) and medicinal management for the training period of 12 weeks. Subjects of the two groups (PEG, YPG) were tested on selected criterion measures namely health related physical fitness variables, PFT and lipid profiles prior to and after the 12 weeks of a training period. The data collected from the two groups before and after the experimental period was statistically examined to find out the significant improvement using the analysis of variance (ANNOVA). Whenever the 'F' ratio was found to be significant, Scheffe's test was 215 used as post hoc test to determine which of the paired means differed significantly. In all cases, the criteria for statistical significance were set at 0.05 level of confidence (P<0.05).

CONCLUSIONS

In the present investigation, as a result of Yoga training programmes the following improvements occurred on COPD related variables, PFT, and COPD questionnaires of COPD patients.

1. It was concluded from the results of the study that the yoga practices groups showed significant improvement in CRP,PFT,Six minute walk test and COPD questionnaires when compared with a medicinal group as well as pre test.
2. Regular practice of yoga- significantly reduced the level of CRP and prevent acute exacerabations.
3. 12 weeks of yoga practices significantly reduced the high CRP level.
4. Systematic and well planned yoga practice programs significantly improves PFT values in COPD patients.
5. Due to the influence of yoga practices significantly increased the level of distance covered in six minute walk test when compared with a medicinal group as well as pre test.
6. The yoga training has differed significantly in all the dependent variables when compared to the medicinal group .
7. YOGA training is a suitable training system to improve the COPD related fitness parameters, PFT and improve the CPR levell in blood among the COPD patients.

The current limited evidence suggested that yoga training has a positive effect on improving lung function and exercise capacity and could be used as an adjunct pulmonary rehabilitation program in COPD patients. However, further studies are needed to substantiate our preliminary findings and to investigate the long-term effects of yoga training.

REFERENCES

The following recommendations are made on the basis of the study.

1. Similar study may be conducted on other Physical, Physiological and psychological variables.
2. Similar studies may be conducted for people suffering from respiratory diseases like Bronchial asthma.
3. Similar research is necessary to explore the effects of different exercise programme for the COPD patients.
4. Similar studies can be conducted with the same variables by selecting the subjects from other environmental aspects.
5. Recommended that there is a need for more research in this field.
6. Respiratory tests may be conducted periodically at general health camps in public so as to estimate the level of lung function test for every individual and to recommend the remedial measures if any.
7. Respiratory testing centre may be established for measuring the level of PFT,CRP equipped with infrastructure facilities and qualified personal for every segment of DELHI.