Role of Pranayama in Rehabilitation of COPD patients - a Randomized Controlled Study

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Abstract

Effects of Pranayama was studied on COPD patients considering PFT, blood gases, 6MWT and SGRQ scores and compared with control. Forty eight patients with severe COPD were randomly divided (24 each) into two groups. Group 1 patients were trained to do paranayama for 3 months for at least half an hour duration. Both the groups were allowed to continue with their usual physical activity and medications. Spirometry, ABG, 6MWT was done and SGRQ scores were measured before and after study. Training-induced changes were greater in group 1 than 2 for following variables: increase of FVC (% predicted) from 68 ± 4.2 to 72 ± 3.9 (p=0.11), FEV1 (% predicted) from 48 ± 2.4 to 52 ±2.1, (p=0.15), PEF (%predicted) from 24.2 ± 0.9 to 30.1± 0.8 (p<0.05), 6MWT from 262 ± 38 to 312 ± 47 m (p<0.05). There was decrease in scores of symptoms (72 ± 2.5 to 66 ± 2.9, p<0.03), activity (66± 2.1 to 50 ± 1.7, p<0.005), impact (53± 2.9 to 39 ± 1.8, p<0.008) and total score (55± 2.9 to 48 ±2.3 p<0.02) in group 1 but not in group 2 patients.

Key words: Pranayama, COPD - Chronic obstructive pulmonary disease. SGRQ - St. George's Respiratory Questionnaire. -6 MWT- Six minute walk test

INTRODUCTION

Comprehensive pulmonary rehabilitation programs are well establish to enhance standard medical therapy and reduce disability in patients with chronic lung diseases I he primary goal is to restore the patient to the highest possible level of independent function. 1 his can be accomplished by helping patients to become knowledgeable about their disease, actively involved in their own health care, independent in performing daily care activities and therefore less dependent on family, friends, health professionals a expensive medical resources.

At present, medical treatment of COPD predominantly focused on the primary ore dysfunction. Despite optimal medication, there is weak relationship between the primary org impairment and disability/experienced handicap. T most important complaints of patients with COPD a dysnea and an impaired exercise performance, which the latter is clearly related to the diminish’ muscle function/ Diminished muscle function is part the result of the commonly occurring muse wasting in patients with COPD, its prevalen. increasing from 20% in clinically stable outpatient up to 35% in patients eligible for pulmona:
To improve muscle function and exercise capacity in patients with COPD, pulmonary rehabilitation is currently accepted as evidence-based intervention strategy. The health benefits of adequate physical activity are well-recognized. Recommendations for physical activity have evolved to the current ones of physical activity of at least a moderate intensity for 30 minutes on all or most days of the week. Despite the benefits of physical activity and the existence of national recommendations, the majority of the patients remain insufficiently active.

The word yoga means ‘union’: union of mind, body and spirit - the union between us and the intelligent cosmic spirit of creation - ‘the oneness of all things'. Recent scientific studies have shown the beneficial role of yogic exercises in management of asthma. Role of yogic exercises in management of cardiac diseases, diabetes, chronic pancreatitis, depressive disorders, epilepsy, osteoarthritis, multiple sclerosis, even for tuberculosis and pleural effusion have been reported. The five principles of yoga are relaxation, exercise (asanas), pranayama (breathing control), nourishing diet, and positive thinking and meditation. Pranayama are yogic breathing techniques that increase the capacity of lungs, help to strengthen the internal organs, improve mental control and deepen your ability to relax.

According to yogic belief, life expectancy is linked to the frequency of respiration if we can learn to slow down our breathing, we can add years to our lives. Yogic breathing or pranayama is part of all yogas and is one of the practices of kundalini yoga. It is the art of controlling the breathing. When patients with COPD were nonspecifically trained the strength of both the inspiratory and expiratory muscles was increased, with beneficial effects on exercise performance and quality of life. In the present study, we have recorded the effects of Pranayama in patients with severe COPD based on the pulmonary function parameters, blood gases, symptoms, activity and impacts scores of the patients.

**MATERIAL AND METHODS**

Forty eight patients (40 men and 8 women) with Spirometric evidence of severe chronic air-flow limitation (ie., FEV1 of < 50% of predicted and FEV1/FVC ratio of < 70% of predicted) were recruited for the study using the St George's Respiratory Questionnaire. They were all observed during a 4 week run-in period, in which their regular treatment was maintained, to verify stability in their clinical and functional status. Patients with age < 40 years, unwilling to give consent, cardiac disease, poor compliance, a requirement for supplemental oxygen therapy, recent hospitalization or CO2 retention (Paco2 > 50 mm Hg), history or spirometric evidence of asthma, evidence of cor pulmonale, abnormal liver, renal or hematological profile were excluded from the study.

**STUDY DESIGN**

This was prospective randomized control study. Patients were randomized using computer generated randomization into two groups: 24 patients were trained to do pranayama for 3 months for at least half an hour duration daily in addition to their usual physical activity and medications, and 24 patients were assigned to be in a control group who were allowed to continue with their usual physical activity and medications for the same duration. All the data were collected by the same collector who was blinded to the different group. The study protocol was approved by the institutional ethics committee, and informed consent was obtained from all the subjects. The following tests were performed before and within 1 week after the completion of the study.

**Spirometry:** FVC, FEV1 and PEF were measured three times on a computerized spirometer (spirobank G), and the best reading was reported.

**6-Minute Walk Test:** The distance the patient was able to walk in 6 min was determined in a measured corridor as described by McGavin and coworkers. The patients were instructed to walk at their fastest pace and cover the longest possible distance in 6 minutes under the supervision of a doctor. The test was performed twice, and the best reading was reported.

**Arterial Blood Gas Analysis:** Both po2 and pc02 levels were measured and reported.
**St George's Respiratory Questionnaire (SGRQ):** It is designed as a supervised self-administered questionnaire. The patients completed the questionnaire themselves under supervision of a para medical staff. Three component scores were calculated for the SGRQ.

*Symptoms* - This component is concerned with the effect of respiratory symptoms, their frequency and severity.

*Activity* - Concerned with activities that cause or are limited by breathlessness.

*Impacts* - Covers a range of aspects concerned with social functioning and psychological disturbances resulting from airway disease.

*A Total score:* It summarizes the impact of the disease on overall health status - over the last three months. Scores are expressed as a percentage of overall impairment where 100 represents worst possible health status and '0' indicates best possible health status.

**Training Protocol:** In all patients of the study group, several practice sessions were done before starting the study in order to optimize the possible training effect. Subjects in this group were asked to do pranayama daily, six times a week, each session consisting of at least 1/2 h. Pranayama consisted of six Asanas (exercises) Bhashka Pranayama, Kapalabhati Pranayama, Vhasya pranayama, Anulom-Vilom pranayama, Bhrmaid pranayama and Udgeedh pranayama. Patients in the control group were allowed to continue with their usual physical activity. Yoga was performed under the supervision of yoga Instructor.

**Data analysis:** SPSS software (version 11 Chicago) was used for all the statistical analysis and results are expressed as mean ± standard deviation. Comparisons of lung function, the 6-min walk test, ABG and the SGRQ in the two groups were carried out using the Student Newman-Keuls tests. All the tests were 2 tailed and critical value of p was set at 0.05.

**RESULTS**

One patient from the study group and two patients from the control group withdrew from the study and the results were compiled from the remaining patients. There were no differences between the V groups in age, height, weight and spirometric values ABG and SGRQ scores at the entrance to the study (Table 1).

**Spirometry**

There was a small but insignificant increase FVC of predicted) and FEV1 (% of predicted) in the study group (from 68 ± 4.2 to 72 ± 3.9, p = 0.16 a from 48 ± 2.4 to 52 ± 2.1, p = 0.28) but not in the control group.

PEF (L/sec) also demonstrated a small but significant increase (% of predicted) in study group (from 24.2 ± 0.9 to 30.1 ± 0.8, p = 0.05) but not in control group Fig 1(3).

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**Table 1. Clinical characteristics of Patients with COPD at baseline**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Study Group (n = 23)</th>
<th>Control Group (n = 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yr</td>
<td>53.3 ±2.9</td>
<td>51.1 ±1</td>
</tr>
<tr>
<td>Male/female sex, No.</td>
<td>18/5</td>
<td>20/2</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>52.6 ±2.4</td>
<td>50.7 ±1</td>
</tr>
<tr>
<td>Height, m</td>
<td>1.62 ±3.7</td>
<td>1.61 ±1</td>
</tr>
<tr>
<td>FVC (L)</td>
<td>2.12 ±0.8</td>
<td>2.20 ±1</td>
</tr>
<tr>
<td>% predicted</td>
<td>68 ± 4.2</td>
<td>69 ± 3</td>
</tr>
<tr>
<td>FEV1 (L)</td>
<td>1.07 ±0.4</td>
<td>1.02 ±1</td>
</tr>
<tr>
<td>% predicted</td>
<td>48 ± 2.4</td>
<td>48 ± 2</td>
</tr>
<tr>
<td>PEF (L/sec)</td>
<td>1.76±0.4</td>
<td>1.68±C</td>
</tr>
<tr>
<td>% predicted</td>
<td>24.2 ±0.9</td>
<td>23.5 ±1</td>
</tr>
<tr>
<td>PaO2, mm Hg</td>
<td>74 ± 4.1</td>
<td>75 ± 4</td>
</tr>
<tr>
<td>PaCO2, mm Hg</td>
<td>42± 1.1</td>
<td>41 ± 1</td>
</tr>
<tr>
<td>6-min walk distance, m</td>
<td>242 ± 38</td>
<td>266 ± 4</td>
</tr>
<tr>
<td>SGRQ score (Symptoms)</td>
<td>72 ± 2.5</td>
<td>75± 2</td>
</tr>
<tr>
<td>SGRQ score (Activity)</td>
<td>66 ± 2.1</td>
<td>63 ± 2</td>
</tr>
<tr>
<td>SGRQ score (impacts)</td>
<td>53± 2.9</td>
<td>51 ± 1</td>
</tr>
<tr>
<td>SGRQ (Total score)</td>
<td>55 ± 2.9</td>
<td>54 ± 2</td>
</tr>
</tbody>
</table>
Blood Gas Analysis

Following the study period, there were no significant changes in the blood gas values either in study or in control group.

6-Minute Walk-Test

There was a small but significant increase of 19% (from 242 ± 38 to 292 ± 47 m, p = 0.05) in the distance walked in 6 min, in the study group but not in the control group Fig 1(4).

St. George’s Respiratory Questionnaire (SGRQ)

SGRQ: There was statistically significant decrease in the symptoms score (from 72 ± 2.5 to 66 ± 2.9, p = 0.03), activity score (from 66 ± 2.1 to 50 ± 1.7, p < 0.005), impact score (from 53 ± 2.9 to 39 ± 1.8, p < 0.008) and the total score (from 55± 2.9 to 48 +2.3 p = 0.02) in study group but not in control group. The threshold for a clinically significant difference between groups of patients and for changes within groups of patients is four units 35 (Fig 2).
**DISCUSSION**

The present study has demonstrated that in patients with significant COPD if specially trained for Yogic breathing called pranayama, show decreased improvement of lung function parameters, improvement in the exercise tolerance, symptoms score, their usual activity and reduction on the impact of disease on their lives.

Pulmonary rehabilitation *per se* results in improvements in health status. Several studies have shown that specific inspiratory muscle training exercises (pranayama) on airway reactivity and histamine ne
to provoke a 20% reduction in FEV1 in patients using pranayama breathing. A parallel group, double blind, randomized controlled trial from Australia has shown that the practice of Sahaja yoga does have limited beneficial effects on some objective and subjective measures of the impact of asthma, others have reported a decrease in the use of beta agonist with the practice of yogic exercises in asthmatic subjects. Other studies have shown no benefit of yoga in asthma patients. Two studies by Nagendra and Nagarathna showed the beneficial effects of yoga breathing exercises for asthmatic patents. In the first study, peak expiratory flow rate values improved after yoga, and a majority of the patients were able to stop or reduce their cortisone medications. The second study showed overall decrease in asthma attacks and medication usage in patients using yoga breathing. A study on effect of yoga on COPD patients showed that lung function parameters (FVC, FEV1, and PEFR) improved after the practice of yoga and indicated that, yoga may be a useful adjunct to other conventional form of therapy for COPD. Some studies have shown beneficial effect of yogic exercises on lung function parameters. In our study, there were significant improvement only in PEFR and improvements in FVC and FEV1 values were insignificant after 3 months of yogic training. There has been a case report of occurrence of pneumothorax with practice of Kapalabhati pranayama but there was no such occurrence in our study.

We conclude that pranayama (Yogic breathing) has an overall positive effect on patients with moderate-to-severe COPD. There was improvement in the lung function parameters. Patients had reduced symptoms, became more actively involved in their own health care, more independent in performing their daily activities increased exercise tolerance and therefore less dependent on family, friends, health professionals, and expensive medical resources. There was improvement in the psychological function of the patient with less anxiety and depression and increased feeling of hope, control and self-esteem. Yogic breathing is a noncompetitive, personal, inexpensive and enjoyable activity which can produce truly amazing results.

REFERENCE

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