EVALUATION OF YOGA THERAPY PROGRAMME FOR PATIENTS OF BRONCHIAL ASTHMA

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ABSTRACT

A study of the effect of yoga therapy programme on 46 indoor patients of chronic bronchial asthma on exercise capacity, pulmonary functions and blood gases was conducted. Exercise capacity was measured by 3 tests: (i) 12 min walk test (12 - md); (ii) physical fitness index (PFI) by modified Harvard step test; and (iii) Exercise-Liability index (ELI). Yoga therapy programme resulted in a significant increase in the pulmonary functions and exercise tolerance. A one-year follow-up study showed a good to fair response with reduced symptoms score and drug requirements in these subjects. It is concluded that yoga therapy is beneficial for bronchial asthma.

Keywords: blood gases, chronic bronchial asthma, exercise tolerance, pulmonary functions tests, yoga therapy.

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INTRODUCTION

Yoga is a traditional system of India for promotion of physical and mental health. Yoga involves an integration of visceral cleansing techniques (Shat-kriyas), physical conditioning by practice of certain body postures (asanas) and breathing exercises (pranayama). Some of these procedures have been applied for treatment of bronchial asthma[1-4]. However, most of these studies were conducted on outpatients. The present investigation was conducted to evaluate the response of hospitalised asthma patients to a specific and controlled yoga therapy programme.

MATERIALS AND METHODS

Forty-two patients (31 men and 11 women) with clinical and functional evidence of moderate to severe bronchial asthma were selected from outpatients. Grading of asthma severity and activity was done on the basis of (i) requirement of bronchodilator therapy, and (ii) frequency and persistence of asthma exacerbations according to criteria proposed by Galent et al[5]. Patients with moderate asthma required daily bronchodilators, while severe asthmatics needed daily bronchodilators with frequent administration of steroids. Each patient had a history of symptoms and signs consistent with chronic bronchial asthma[6]. None of these patients had detectable coronary artery or other significant illness. Each patient had a chest X-ray, ECG, routine laboratory tests and spirometry (9-L water sealed spirometer). The physical characteristics of the patients are given in Table I. After initial assessment, they were admitted to our hospital for a period of 40 days. They were given vegetarian diet and daily yoga training for $1^1/_2$ hours in the morning and one hour in the evening according to a specific and pre-fixed protocol[7]. Yoga practice comprised (i) visceral cleansing procedures, (ii) body postures, and (iii) breathing exercises. All procedures were practised sequentially in the morning but in the evening only body postures and breathing exercises were practised. No drugs including bronchodilators were given for 12 hours before any test and as far as possible tests were conducted during the stable phase of their illness.

Measurement of exercise performance

With informed consent, exercise performance was assessed by three tests: (i) 12 minutes walk test(12-md): this was the distance a patient could walk in 12 mins or less in an enclosed corridor[8]; and (ii) physical fitness index (PFI) was measured by modified Harvard step test[9]. This test was performed by stepping on and off a stool (stepping height 46 cm) at a rate of 30 steps/minute for 5 minutes, unless obliged to stop sooner. The stepping rate was controlled with the help of a metronome. The time of exercise and pulse rates were recorded after termination of exercise and PFI was scored as :

$$PFI = \frac{\text{Duration of exercise in secs} \times 100}{2\,(RPR_1 + RPR_2 + RPR_3)}$$

where RPR_1 = Recovery pulse rate between 60 secs-90 secs.
RPR_2 = Recovery pulse rate between 120 secs-150 secs.
RPR_3 = Recovery pulse rate between 180 secs-210 secs.

Arterial capillary blood[10] were sampled before and after the end of this test and pO_2, pCO_2 and pH were determined in duplicate with a blood gas analyser (AVL-938, Switzerland). (iii) For measurement of exercise liability index (ELI) free range running was done. This test was repeated the next day if the pulse rate did not reach 150-160 /min (PEFR) at the end of the run[11].

Peak expiratory flow rates (PEFR) were measured before, during (at 2 min intervals) and after (at intervals of 5 min for 30 min) and ELI was calculated by the procedure of Koning and Godfrey[12]. All tests were repeated within 3 days before completion of therapy period of 40 days. Changes in measurement were analysed by students 't' test for paired values. A 'p' value of less than 0.01 was considered significant.

Follow-up

Patients were asked to attend a follow-up clinic once a month. A questionnaire concerning frequency of asthma, the medication used, and work day lost due to asthma was regularly mailed to them[13]. On follow-up day, physical examination, PFI measurement and of dyspnoea experienced on various physical work, applying a modified Medical Research Council Scale[14] was assessed (Appendix I).

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Appendix I - Modified Medical Research Council (MRC) Dyspnoea scale

Grade	Description
0	Not troubled with breathlessness except on strenuous exercise or work. Have not abstained from work due to asthma.
1	Feel shortness of breath on running but have not abstained from work due to asthma.
2	Walk slower than other people, but able to function and do work.
3	Need to rest or stop for breath after a few minutes walk.
4	Severely bothered with breathlessness.

The response to yoga practice was graded as follows:

Good: The patient remained asymptomatic without medication, without disability due to asthma. The MRC dyspnoea scale decreased to 1 or less.

Fair: The patient showed symptomatic improvement with decrease in MRC dyspnoea scale, but required medication on some days in one year, but no abstinence from work due to asthma.

Poor: The patient required frequent medical treatment, disability due to asthma with no change in MRC dyspnoea rating.

RESULTS

Table I - Demographic Measurements of 42 patients with Bronchial Asthma

Parameters	Yoga Taining	
	Before	After
1. Age (yrs)	48.2 ± 4.17	-
2. Duration of disease (yrs)	10.6 ± 7.48	-
3. BMI (kg/m^2)	20.4 ± 3.63	20.7 ± 3.14
4. RR (breath/min)	20.7 ± 4.23	18.1 ± 3.16
5. HR (beat/min)	98.7 ± 17.42	92.4 ± 13.15
6. FEV_1 (% pred)	40.8 ± 8.27	52.6 ± 7.18*
7. PEFR (lit/min)	28.5 ± 46.70	36.8 ± 57.20

Values are mean ± SD, *p < 0.01
Definition of abbreviations:
BMI = Body Mass Index
RR = Resting Respiration rate
HR = Rest Heart rate
FEV_1 = Forced expiratory volume in one second
%pred = Percent predicted of normal value
PEFR = Peak expiratory flow rate.

Yoga training resulted in a small decrease in resting heart rate (HR) and respiration rate (RR) and a significant increase in FEV_1 and PEFR (Table I). Yoga improved the exercise performance capacity and exercise tolerance as indicated by the significant increase in 12-md and PFI and decrease in ELI after 40 days of yoga training. There was a small but significant decrease in HR and RR at the end of strenuous exercise, after yoga training (Table II). Resting pCO_2 and pH did not show any change but pO_2 increased, post training. On exercise performance (Step test) there was significant increase in pO_2 from pre-training values (Table III). Only 31 (74%) could be followed up for one year. These patients continued to practise yoga for 15-30 minutes everyday. Out of these, 18 patients

Table II - Results of Exercise Tests in 42 Asthmatic Patients

	Yoga Training	
	Before	After
1. 12 md (metres)	482.4 ± 101.5	520.2 ± 91.6*
2. PFI	29.9 ± 12.2	45.1 ± 11.3*
(i) RR max	35.4 ± 5.39	31.3 ± 5.24*
(ii) HR max	144.8 ± 18.83	129.2 ± 82.8
3. ELI	63.8 ± 18.9	52.5 ± 14.3*

Values shown are mean ± S.D, *p <0.01
Definition of abbreviations :
12 md = Distance in metres walked in 12 min;
PFI = Physical fitness index assessed by step test
RR max = Maximum respiration rate at termination of step test;
HR max = Maximum heart rate at termination of step test;
ELI = Exercise-induced bronchial liability index

Table III - Comparison of Blood pO_2 pCO_2, and pH in Asthmatic Subjects

	Yoga Training	
	Before	After
1. $Pa0_2$ mmHg (Resting)	69.4 ± 6.96	76.5 ± 11.9*
2. $Pa0_2$ mmHg (Post exericse)	73.6 ± 8.9	80.0 ± 6.82*
3. $PaC0_2$ mmHg (Resting)	37.6 ± 3.39	37.6 ± 4.13*
4. $PaC0_2$ mmHg (Post exercise)	41.5 ± 5.17	39.5 ± 4.98*
5. pH (Resting)	7.3888 ± 0.045	7.385 ± 0.025
6. pH (post exercise)	7.378 ± 0.064	7.383 ± 0.031

Values shown are mean ± S.D, *p < 0.01
Post exercise = At termination of Harvard step test.

Table IV - Results of one-year follow-up of 31 Asthmatic patients

Severity of Asthma	Follow-up		Response Pattern		
	(B)	(A)	Good	Fair	Poor
Mild	-	19	15	3	1
Moderate	23	7	3	2	0
Severe	8	5	0	2	3
Total	31	31	18	7	4

B: Before Yoga
A: After Yoga

initially with moderate to severe asthma remained asymptomatic for one year, while 13 required medical treatment at one time or other (Table IV).

DISCUSSION

Exercise reconditioning programme[15] has been recommended for rehabilitation of chronic bronchial asthma patients. Yoga involves integration of techniques of cleansing respiratory tract[4,16], physical conditioning[1,7] and breathing exercise[18] and has been reported to have good response in the treatment of asthma[1-4]. Yoga is being applied as an adjunct therapy for

patients with chronic airways obstruction[19]. The present investigation demonstrates that a specific yoga therapy programme decreases the exercise-induced bronchoconstrictive response in patients of chronic bronchial asthma. There is no similarity between the physical exercise and yoga techniques. Yoga techniques employed in the present study were: (i) certain visceral cleansing procedures; (ii) maintenance of certain body postures; and (iii) breathing training. It is hypothesised that yogic cleansing procedures help in removal of secretion from bronchial tree[4] and yogic breathing exercises provide training in the efficient use of abdominal and diaphragmatic muscle in breathing[16]. Yogic postures reduce psychological over-activity[19] in asthmatic and also induce an increase in muscle efficiency[20]. In recent years, some studies have indicated the possible application of yoga for management of asthmatic patients. However, these were conducted on outpatients and yoga techniques either were not specified or varied. In the present investigation, all subjects were admitted in a hospital and were given a specific intensive yoga training for 40 days, which was followed by home yoga practice for one year. The evaluation of response to yoga practice to MRC, 12 - md, ELI and blood gases are some of the well documented tests to assess disability in patients with dyspnoea. The increase in 12-md, and reduction in ELI and MRC rating reflect the good response of chronic asthma patients to yoga. It is concluded that yoga therapy is a feasible and economical mode of treatment and rehabilitation for patients of chronic bronchial asthma.

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