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## Research Article

# Assessment of the Severity of Disease in Patients with Bronchial Asthma, Before and After Yoga: A Randomised Trial

## Abstract

**Introduction:** Asthma is a common chronic inflammatory disorder affecting about 300 million people worldwide. As a holistic therapy, yoga has the potential to relieve both the physical and psychological suffering of people with asthma, and its popularity has expanded globally. Yoga includes several techniques: physical postures (asanas), voluntarily regulated breathing (pranayama) and meditation.

**Materials and Methods:** Sixty patients with bronchial asthma underwent training for eight weeks in an integrated set of yoga exercises, including breathing exercises, suryanamaskar, yogasana (physical postures), pranayama (breath slowing techniques), dhyana (meditation) and were told to practice these exercises for 65 minutes daily. They were then compared with a control group of sixty patients with asthma matched for age, sex, and type and severity of asthma, who continued to take their usual drugs. Their daily records were used to assess the number and severity of attacks and the medication used by them. Apart from that, Group A patients also kept a record of the Yogic Exercises performed by them twice daily.

**Results:** There was a significantly greater improvement in the group who practiced yoga in the weekly number of attacks of asthma, scores for drug treatment, and peak expiratory flow rate.

**Conclusion:** This study showed the efficacy of yoga in the long term management of bronchial asthma, but the physiological basis for this beneficial effect needs to be examined in more detail.

## Introduction

Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. The chronic inflammation causes an associated increase in airway hyper-responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing particularly at night or in the early morning. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment [1].

The use of complementary and alternative medicines (CAM) for asthma treatment is of great interest in patient care [2,3].

Regular practice of yoga may be useful in patients of bronchial asthma [4-7].

Yoga therapy readjusts the autonomic imbalance and controls the rate of breathing and thus alters various physiological variables. These changes are attributed to the

decreased sympathetic reactivity and relaxation of voluntary inspiratory and expiratory muscles [8,9].

The practice of breathing exercise increases parasympathetic activity and decreases sympathetic activity, improves cardiorespiratory functions by affecting oxygen consumption, metabolism and skin resistance [10].

Various studies on the efficacy of pranayama and other breathing techniques in asthmatics have been conducted [11-15].

Studies by Nagarathna and Nagendra, Murthy et al., Kumar et al., Singh et al., Jain et al., and Singh V, have all reported the improvement of the various disease parameters in asthmatics with the use of pranayama and related controlled ventilation exercises [4,7, 11-15].

Thus yogic practices like pranayama may be useful in patients of perennial bronchial asthma with mild to moderate symptoms.

## Aim

To assess the effect of yoga on severity of the disease and peak expiratory flow rate (PEFR) in patients with bronchial asthma.

## Materials and Methods

The present study on one hundred and twenty non-smoking patients of either sex, in the age group of 17–50 years, diagnosed with mild to moderate grades of bronchial asthma and recruited from Christian Medical College & Hospital, Ludhiana and from the yoga camps organized by renowned yoga experts, in Ludhiana was conducted in the Departments of Medicine and Physiology of this institution between October 2005 and March 2007. The recruited patients were randomized in two groups i.e. Group A and Group B.

**Group A:** Yoga training group

**Group B:** Control group

**Diary record:** (refer Appendix 1)

Detailed information was provided for maintaining diaries. They were all also provided with a sample of the diary page. Patients maintained regular diary records at home and recorded the number and severity of attacks and the medication used by them. Apart from that, Group A patients also kept a record of the Yogic Exercises performed by them twice daily.

At each visit information from patient diary were recorded. Their diary records were counter checked by asking relevant questions during their visits.

### Entry in diary

**A. At start of the study period** – A history of various events in last 2 months for both the groups were recorded.

**B. At the end of 4 weeks and 8 weeks of study period** – (Data of each week from the diary records).

Diary Record included the following:

1. Number of attacks /week.
2. Severity of attack.

Grades of severity:

Grade 1–Mild – Did not disturb sleep or daily routine.

Grade 2–Moderate –Disturbs sleep and daily routine and relieved by oral drugs.

Grade 3–Severe – Required intravenous drugs or admission to the hospital.

Doses of drugs – Includes Oral drugs, Inhaler/Rota caps – number of puffs/Rota capsules/day, injectable bronchodilators and steroids.

Dosage of drugs–

Decreased.

Stopped.

Remained same.

Increased.

**Peak expiratory flow rate (PEFR):** This was estimated on the patients of both the groups at baseline, after 4 weeks and then after 8 weeks. The pulmonary function tests were done on a computerized spirometer, MEDSPIROR.

**Mild attacks** – Did not disturbs sleep or daily routine.

**Moderate attacks** – Disturbs sleep and daily routine and relieved by oral drugs.

**Severe attacks** – Requires intravenous drugs or admission to hospital.

**Instructions** – Please Enter the Record and Tick the appropriate boxes.

### Statistical analysis

The comparison of the pre and the post value across the study and the control group was done using repeated measures Analysis of Variance (R M ANOVA).

Comparison of proportion showing clinically significant improvement after making adjustment of compounding factors like age, duration of disease etc were carried out by using logistic regression analysis.

## Results

As per the patients' "diary records" the "number of attacks per week scores", showed a decline in Group A, which was significant at 8 weeks as compared to the baseline ( $p < 0.01$ ) and 4 weeks ( $p < 0.05$ ), while the scores in Group B showed an increase over time. The difference in scores at 8 weeks between Group A and Group B was statistically significant ( $p < 0.05$ ) (Table 1).

As per the patients' "diary records" the "severity of attacks score" showed a steady and significant decline in Group A from baseline to 4 weeks to 8 weeks, while scores in Group B showed an increase over time. The difference in scores at 8 weeks between Group A and Group B was statistically significant ( $p < 0.05$ ) (Table 2).

**Table 1:** Variations in mean scores of number of attacks per week

Period	Group A		Group B		t-value	p-value
	Mean	S.D.	Mean	S.D.		
Baseline	0.53	0.53	0.53	0.50	0.00	> 0.10, NS
4 Weeks	0.46	0.53	0.55	0.50	0.96	> 0.10, NS
8 Weeks	0.38	0.48	0.58	0.53	2.17	< 0.05, S

	Group A		Group B	
	Paired t-value	p-value	Paired t-value	p-value
Baseline vs 4 Weeks	1.66	< 0.10, NS	0.44	> 0.10, NS
Baseline vs 8 Weeks	3.23	< 0.01, S	1.14	> 0.10, NS
4 Weeks vs 8 Weeks	2.32	< 0.05, S	1.43	> 0.10, NS

As per the patients' "diary records" the "dosage of drugs required score" during the study period were higher in Group B than in Group A, at all times, but the differences were statistically not significant ( $p > 0.10$  at all times). Group A scores showed a decline over time, which was statistically significant when compared between baseline and 8 weeks ( $p < 0.05$ ), while Group B scores showed an increase over time (Table 3).

Percentage of predicted PEFR was higher in Group A subjects than in Group B at all periods of measurement, but the differences were statistically not significant (Table 4).

Group A subjects showed a statistically significant increasing trend in % PEFR over time: from  $79.81 \pm 10.78$  % at baseline to  $80.75 \pm 10.17$  % at 4 weeks to  $82.45 \pm 10.17$  % at 8 weeks ( $p < 0.01$  in all cases) while Group B subjects showed variable change in % PEFR (Table 4).

### Discussion

In the present study, diary records regarding the daily number of attacks, severity of attacks and the dosage of medication required were maintained by all the patients in the two groups.

The scores for "number of attacks per week" at baseline were comparable between the two groups ( $p > 0.10$ ). While the scores at 4 weeks also remained comparable between the two groups, the difference between this diary record score at 8 weeks between Group A and Group B was statistically

**Table 2:** Variations in mean scores of severity of attacks

Period	Group A		Group B		t-value	p-value
	Mean	S.D.	Mean	S.D.		
Baseline	0.70	0.77	0.78	0.80	0.56	> 0.10, NS
4 Weeks	0.58	0.72	0.80	0.80	1.58	> 0.10, NS
8 Weeks	0.50	0.70	0.83	0.83	2.35	< 0.05, S

	Group A		Group B	
	Paired t-value	p-value	Paired t-value	p-value
Baseline vs 4 Weeks	1.99	< 0.05, S	0.28	> 0.10, NS
Baseline vs 8 Weeks	3.23	< 0.01, S	0.77	> 0.10, NS
4 Weeks vs 8 Weeks	2.32	< 0.05, S	1.00	> 0.10, NS

**Table 3:** Variations in mean scores of dosage of medication required

Period	Group A		Group B		t-value	p-value
	Mean	S.D.	Mean	S.D.		
Baseline	2.63	1.37	2.73	1.55	0.37	> 0.10, NS
4 Weeks	2.55	1.36	2.75	1.62	0.73	> 0.10, NS
8 Weeks	2.48	1.38	2.82	1.63	1.23	> 0.10, NS

	Group A		Group B	
	Paired t-value	p-value	Paired t-value	p-value
Baseline vs 4 Weeks	1.69	< 0.10, NS	0.38	> 0.10, NS
Baseline vs 8 Weeks	2.26	< 0.05, S	1.30	> 0.10, NS
4 Weeks vs 8 Weeks	1.43	> 0.10, NS	1.43	> 0.10, NS

**Table 4:** Variations in peak expiratory flow rate (pefr) [% predicted]

Period	Group A		Group B		t-value	p-value
	Mean	S.D.	Mean	S.D.		
Baseline	79.81	10.78	79.53	8.29	0.16	> 0.10, NS
4 Weeks	80.75	10.17	79.20	8.09	0.92	> 0.10, NS
8 Weeks	82.45	10.17	79.42	8.26	1.79	< 0.10, NS

	Group A		Group B	
	Paired t-value	p-value	Paired t-value	p-value
Baseline vs 4 Weeks	3.27	< 0.01, S	1.20	> 0.10, NS
Baseline vs 8 Weeks	7.40	< 0.01, S	0.55	> 0.10, NS
4 Weeks vs 8 Weeks	5.76	< 0.01, S	0.94	> 0.10, NS

significant ( $p < 0.05$ ). In Group A, there was a steady decline in the scores which was significant at 8 weeks as compared to the baseline ( $p < 0.01$ ) as well as compared to the score at 4 weeks ( $p < 0.05$ ). On the other hand, scores in Group B showed a steady increase over time. The increments, however, were statistically not significant at any time, when compared within the group.

Similarly, for the mean "diary record scores" on the "severity of attacks" at baseline and at 4 weeks were comparable between the two groups ( $p > 0.10$ ), but the difference between this diary record score at 8 weeks between Group A and Group B was statistically significant ( $p < 0.05$ ). In Group A, there was a steady decline in the scores which was significant at 4 weeks as compared to the baseline as well as at 8 weeks as compared to the score at 4 weeks ( $p < 0.05$ , in both cases), and at 8 weeks as compared to baseline ( $p < 0.01$ ). On the other hand, scores in Group B showed a steady increase over time. The increments, however, were statistically not significant at any time, when compared within the group.

The mean "diary record scores" as regards the dosage of drugs required during the study period were higher in Group B than in Group A, at baseline, 4 weeks and at 8 weeks, but the differences were statistically not significant ( $p > 0.10$  at all times).

Group A scores showed a steady decline over time, which was statistically significant when compared between baseline and 8 weeks ( $p < 0.05$ ). On the other hand Group B scores showed a steady increase over time, but the differences in scores were statistically not significant.

Other authors have also studied patients' recall of these parameters.

In the study by Nagarathna and Nagendra [4] the number of attacks of asthma / week showed significant improvement with scores declining from mean values of  $3.55 \pm 2.98$  initially to  $0.83 \pm 2.49$  finally in the yoga group as compared to  $2.9 \pm 3.01$  to  $2.1 \pm 2.7$  in the control group.

In the same study, the reduction in the severity of asthma attacks scores however showed no significant difference between the yoga and control groups.

Symptom scores in the study by Murthy et al. [7], showed significant reduction after 15 days breathing training in males and after 45 days training in females.

In the study by Singh et al. [14], compared with the baseline, inhaler use decreased more with PCL exerciser than with the placebo device, but the changes were small and the difference between the two devices were not significant.

Murthy et al. [7] reported that the mean drug scores of patients requiring oral bronchodilators reduced significantly from their initial values of  $2.71 \pm 1.54$  after breathing training, but patients on steroids as well as bronchodilators did not show any significant reduction in their dosage schedule.

The study by Nagarathna and Nagendra [4] also showed significant beneficial effect of pranayama on drug usage ( $p < 0.01$ ) after a 54 months' yoga training program.

In the study by Cooper et al. [15], however, bronchodilator use was reduced in patients who practiced Buteyko breathing technique, but there was no change in those who practiced pranayama.

Thus in our study the "diary record scores" for number of attacks per week, severity of asthma attacks as well as requirement of drugs showed significant improvement after pranayama training of 8 weeks. However, drug usage showed no difference between the pranayama training group and control group at 8 weeks. This, however, may have been different if the training period could have been increased, as evidenced in the study by Nagarathna and Nagendra [4] where 54 weeks of training showed significant reduction in drug usage.

## Conclusion

In the present study on one hundred and twenty non-smoking patients diagnosed with mild to moderate grades of bronchial asthma, pranayamic breathing training, used adjunctively with standard treatment, proved to be beneficial in terms of patients' own assessment of number of asthma attacks per week, the severity of the attacks and the dosages of medication required by them. This was further reinforced by the significant increase in the PEFr as measured by medspiror in patients who were preformed yoga.

Given the current tendency of patients and medical practitioners to explore and to lean towards alternative therapeutic modalities, particularly those which involve a natural approach rather than the pharmacological interference by allopathic treatment, we, on the basis of the findings of this study, would want to recommend yogic training, especially pranayama, to sufferers of such chronic diseases as asthma.

However, it needs to be pointed out that this study involved only sixty patients in either group who were studied for a period of eight weeks only. Also, the study included non-smokers with mild to moderate asthma only.

Further studies with larger sample sizes and longer follow up should be undertaken and the effect of pranayama in asthmatics who smoke and in severe grades of asthmatics should be evaluated.

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