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Impact of pranayama breathing practice on quality of life, lung function, and asthma control

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Abstract

Asthma is a prevalent long-term respiratory illness characterized by variable airflow limitation, bronchial hyperreactivity, and persistent airway inflammation. Over the past 60 years, the prevalence of asthma, which affects around 300 million people globally, has sharply increased in both adults and children, especially in developed nations. Patients with asthma who have their symptoms inappropriately and infrequently treated have lower quality of life and are unable to lead productive lives. Because of this, maintaining a higher quality of life and controlling the disease must be the primary goals of treating asthma. A multifaceted approach involving nonpharmacological strategies that assist patients in better coping with their asthma is necessary for disease management in addition to pharmacological treatment, as the normal progression of asthma continues with recurrent attacks even with the administration of optimal drugs. As a result, a lot of asthma patients now turn to complementary and integrative methods (including breathing exercises, yoga, herbal remedies, acupuncture, and homeopathy) to cure their condition and reduce their symptoms.

Keywords: Asthma, homeopathy, yoga, herbal remedies, acupuncture

1. Introduction

The history of asthma extends back to Hippocrates, the "father of medicine," who described the illness as "deep and heavy breathing." With the meaning "breathless," the Greeks gave it the name ASTHMA.

It is a prevalent chronic airway condition involving a complicated relationship between underlying inflammation, bronchial hyperresponsiveness, and restriction of airflow. Exposure to a range of stimuli, such as allergens or irritants, causes the major physiological event that results in clinical symptoms of airway narrowing and a subsequent interference with airflow (bronchoconstriction). Histamine, tryptase, leukotrienes, and prostaglandins are among the mediators that mast cells release in response to allergens, causing an IgE-dependent acute bronchoconstriction that contracts the smooth muscle of the airways.

Even though bronchoconstriction is the first sign of bronchial asthma, each asthmatic patient has different levels of airway inflammation. Even if asthma symptoms are episodic, airway inflammation persists, yet it is unclear how severe asthma is related to how intense the inflammation is. All clinical manifestations of asthma seem to follow a similar pattern of airway inflammation.

In asthma, activated mast cells, eosinophils, and T lymphocytes exhibit a distinctive pattern of inflammation that contributes to symptoms by releasing mediators. By generating inflammatory mediators, the structural cells of the airways also contribute to the inflammation. Patients with asthma exhibit distinct structural alterations in their airways, which are commonly referred to as airway remodeling, in addition to the inflammatory response. A comparatively irreversible narrowing of the airways may arise from certain of these alterations, which are connected to the disease's severity. The last common link connecting asthma symptoms and physiological alterations is airway constriction. When a patient with asthma responds to a stimulus that would be harmless in a healthy person, their airways shrink, a condition known as airway hyper responsiveness (AHR), the distinctive functional abnormality of asthma. Variable airflow limitation and sporadic symptoms follow from this.

1.1 Need for the study

Asthma is a disorder that dates back to the time of

Hippocrates1, "the father of medicine," who described a "deep and heavy breathing" illness. It was called ASTHMA by the Greeks, which means 'breathless.'

It is a common chronic airway condition that involves a complex interaction of obstruction of airflow, bronchial hyper-responsiveness and inflammation underlying it. In response to exposure to a variety of stimuli, including allergens or irritants, the primary physiological event leading to clinical symptoms of airway narrowing and eventual interference with airflow (bronchoconstriction) takes place. Acute broncho constriction caused by allergens results from the IgE-dependent release of mast cell mediators that include histamine, tryptase, leukotrienes, and prostaglandins that directly contract smooth muscle 2 from the airway.

While bronchial asthma begins with bronchoconstrusion, there are different degrees of inflammation of the airway in any asthma patient. Even though symptoms are episodic, airway inflammation is persistent, but the relationship between asthma severity and inflammation intensity is not well defined. In all clinical types of asthma4, 5 the pattern of inflammation in the airways tends to be identical.

Improvements in quality of life have been recorded in respiratory physiotherapy-based breathing exercise studies and decreases in the use of bronchodilator25 in asthma; however, its effect on the pulmonary function test is uncertain. Breathing techniques such as pursed-lip breathing have been advocated in asthma for respiratory physiotherapy. Pursed-lip breathing is said to help to provide a better sense of control over their respiratory disease, which in turn helps patients relax during flare-ups so that symptoms can be reduced26. Clinicians seldom refer to their chronic asthma patients for breathing exercises, however. The role of respiratory physiotherapy in the regular treatment of asthma must also be measured.

Pranayama and respiratory physiotherapy have been found to be equivalent. Thus, in contrast to controls on standard care, our research was conducted to witness the impact of Pranayama or respiratory physiotherapy breathing exercise on subjects with chronic bronchial asthma on standard care and to see if the effect of Pranayama is superior in asthmatics to respiratory physiotherapy.

2. Review of Literature

In order to ascertain whether asthma patients' autonomic and pulmonary functioning are enhanced by brief yoga instruction, Guleria and Deepak (2021) carried out a study. Nine patients with bronchial asthma diagnoses were chosen as study participants. A seven-day yoga camp was held at Adhyatma Sadhna Kendra in New Delhi. The pulmonary function tests, the hand grip test, the cold pressure test, and the deep breathing test are examples of autonomic function tests that measure parasympathetic reactivity. Recordings were made of FVC, FEVI' PEFR, PIF, BHT, and CE both before and after yoga instruction. Following yoga training, there was a substantial drop in resting heart rate ($P < 0.05$), going from 89.55 ± 18.46/min to 76.22 ± 16.44/min. After yoga instruction, there was a substantial ($P < 0.01$) decrease in PBP after HGT, which suggests a reduction in sympathetic reactivity. Parasympathetic reactivity did not alter. The FEVI' PEFR and FVC did not exhibit any notable changes. Significant improvement was observed in the PIF ($p<0.01$), BHT ($p<0.01$), and CE ($p<0.01$). The findings clearly showed that voluntary inspiratory and expiratory muscle relaxation improved pulmonary ventilation while reducing sympathetic reactivity. Even in a brief amount of time, the extensive yoga lifestyle modification program for bronchial asthma sufferers has demonstrated a substantial benefit.

In a 2021 study, Kauffman, J. L. interviewed 08 (eight) bronchial asthmatic patients who used yoga techniques. The structured interview procedure was adapted from the Moos and Tsu Model of Physical Illness. It was discovered that a small percentage of the participants thought their asthma symptoms were significantly improved by practicing yoga techniques. A smaller impact or no positive impact was noted by some participants. Some individuals claimed that practicing yoga techniques had significantly reduced their use of pharmaceuticals. Every participant mentioned that practicing yoga had improved their overall physical and mental wellbeing. The individuals who claimed the greatest degree of influence also mentioned using a variety of other complementary and alternative therapies.

In a 2021 study, Jain, Rai, Valecha, Jha, Bhatnagar, and Ram gave yoga instruction to 46 young asthmatics who had previously experienced asthma as children. Training effects were examined on exercise capacity, exercise-induced bronchial lability index, and resting pulmonary functions. Exercise capacity and lung function significantly increased with yoga instruction. A two-year follow-up research revealed that these participants had improved responsiveness, with lower symptom scores and medication requirements. It has been determined that young asthmatics benefit from yoga instruction.

The purpose of the study, which was carried out in 2020 by B. Sabina, Annaleila Williams, K. Wall, Bansal, Chupp, and L. Katz, was to ascertain "the effectiveness and feasibility of yoga and breathe work intervention for improving clinical indices and quality of life in adults with mild-to-moderate asthma." A clinical experiment that was double-masked, randomized, controlled, and took place between October 1, 2001, and March 31, 2003. A 4-week yoga intervention consisting of postures and breath work was randomly assigned, as was a stretching control condition. At 4, 8, 12, and 16 weeks, the Mini Asthma Quality of Life Questionnaire, the use of rescue inhalers, spirometry, symptom diaries, and health care utilization were among the outcome indicators that were assessed. Forty-five of the sixty-two individuals who were assigned to the intervention and control groups finished the last set of follow-up tasks. An examination of intention-to-treat was carried out. At 4 and 16 weeks, both groups showed significant within-group differences in morning symptom scores and post-bronchodilator forced expiratory volume in 1 second; however, no significant differences were seen between groups on any outcome measures, leading to the conclusion that Iyengar yoga had no discernible benefit for mild-to-moderate asthma. There may be situations in which yoga helps treat asthma, but these are not yet known.

3. Objectives of the study

1. Effect of breathing exercises with Pranayama or respiratory physiotherapy on lung functions and peak expiratory flow rate (PEFR) in chronic bronchial

asthma
2. Effect of breathing exercises on the prevention of acute exacerbation in chronic bronchial asthma with Pranayama or respiratory physiotherapy

4. Research methodology

The present study is intended to evaluate Pranayama's efficacy in decreasing the level of depression among the elderly. The chapter deals with a brief overview of the various steps that the researcher or analysis is taking under. This includes research method, environment, population, sampling and sampling methodology, tool range, validity, reliability, pilot project, data collection process, and data analysis plan. This study was conducted in New Delhi. The elderly from Indian Red Cross Society Old Age Home, Saket, New Delhi and the sampling too was from the same site. Such a setting was chosen as maximum number of patients with chronic asthma on stable therapy was likely to visit. This study was a controlled (non-randomized) clinical trial with three separate groups consisting with adult patients with persistent, chronic asthma who met the criteria for inclusion and exclusion. The patients were initially stable on medication until no further symptomatic progress took place. Along with standard treatment, all research subjects were assigned to the respiratory physiotherapy group or the Pranayama group, and only standard treatment was provided to the control group. Participants included qualifying subjects who met the study's requirements of inclusion and exclusion. The research included a total of 150 subjects. These patients were eventually assigned to three groups.

4.1 Statistical analysis of the study

For all the quantitative data between the 3 groups and the Chi-square test for the qualitative data, the study was carried out using ANOVA, a one-way variance analysis (F-test). Using descriptive statistics, all the descriptive analysis of age, sex, degree of dyspnoea, and asthma symptom score was performed. Age, gender and period of asthma were balanced by confounding variables. Adjustment was not needed for confounding variables because it was done at the time of subject selection.

5. Results and data interpretation

Four of the Pranayama group's subjects were lost to follow-up before the study's conclusion. These subjects could not be located and did not show up for the follow-up. Adverse effects resulted in the withdrawal of two trial participants from the Pranayama group. Total sample size is 150 in this randomly selected sample is used for analysis. One of them experienced neck pain, while the other reported being easily fatigued. Thus, 52 participants in the Pranayama group finished the study. No adverse events were observed, although five participants in the respiratory physiotherapy group were lost to follow-up and were not able to be contacted. In this group, 50 participants were able to finish the study. At the beginning of the six-week trial, 35 subjects were assigned to the control group; however, 4 of those subjects failed to show up for their follow-up, leaving 31 subjects in the control group.

The distribution of subjects among the study groups, the number of subjects who have finished the study, and the dropout rate for each group are displayed in Table.

Table 1: The allocation groups, number of subjects that completed the study and number of drop out in each group

Pranayama Group (Group 1) n = 58		Respiratory Physiotherapy Group (Group 2) n = 55	Control Group (Group 3) n = 37
Lost to Follow up	4	5	6
Withdrawn due to Adverse Event	2	0	0
Total Number Completed the Study	52	50	31

The baseline demographic features of the study individuals in the three groups are displayed in Table. The three study groups did not significantly differ in their mean age groups. There was no discernible statistically significant difference between the sexes. Although the Control group's weight and Body Mass Index appeared to be higher, these differences were not statistically significant.

Table 2: Baseline demographic characteristics of the subjects in the three study groups

Pranayama Group (n=52)		Respiratory Physiotherapy Group (n=50)	Control Group (n=31)	p value
Age (years)†	42 ±14	44 ±15	47 ±17	.331
Males	22	18	14	.193
Females	30	32	17	
Weight (kg) †	58 ± 11	56 ± 12	61	.147
Height (cm) †	158 ±16	157 ±10	158 ±10	.813
Body Mass Index †	22.7283	22.6345	24.4611	.127

There is no discernible difference in the baseline values of FEV1, FVC, FEV1/FVC, and PEFR between the research groups, as Table 3 demonstrate. Although the Control group's FEV1/FVC ratio was marginally higher, this difference is not clinically significant. Nevertheless, the FEV1/FVC levels in the control group do not show active, continuing airway restriction; therefore, an increase in FEV1 above typical control levels is not likely. Between the three research groups, there was no statistically significant variation in the levels of immunoglobulin E, C-reactive protein, or absolute eosinophil count.

Table 3: The baseline values for pulmonary function tests and markers of pathophysiology of bronchial asthma

Pranayama Group (n=52)		Respiratory Physiotherapy Group (n=50)	Control Group (n=31)	p value
Duration of Asthma (yrs)	22.7812±16.184	28.1783±17.252	18.0924±13.450	.543
FEV_1 (L) †	1.79 ±0.89	1.69 ±0.94	1.99 ±0.97	.315
FVC (L) †	2.36 ±1.02	2.16 ±1.17	2.41 ±0.98	.228
FEV_1/FVC (%) †	73.75±14.24	78.21 ±12.35	81.45 (±13.38)	.047
PEFR (mL/min) †	284 ±137	258 ±135	284 ±189	.592
IgE (IU) †	2358.56 ±2660.35	1492.05 ±1589.60	1245.53 ±1645.47	.095
AEC (cells/cmm) †	383.38 ±215.72	375.90 ±239.63	319.31 ±221.55	.358
CRP (mg) †	5.01 ±14.70	7.93 ±21.63	6.13 ±25.74	.489

Table demonstrates that a higher proportion of individuals in the Pranayama group exhibited dyspnea grade 2 than those in grades 1 or 3. The control group and the respiratory physiotherapy group exhibit a similar pattern.

Table 4: Frequency of dyspnoea grade at baseline in the three study groups

Parameter		Pranayama Group (n=52)	Respiratory Physiotherapy Group (n=50)	Control Group (n=31)
Number of	1	0	0	0
subjects with	2	12	13	1
Dyspnoea	3	34	27	24
Grade	4	6	10	6

In comparison to the other 2 study groups, Table 4b demonstrates that the Pranayama group performed better on the 6-minute walk test and the breath holding test. The Pranayama group recorded a mean 6-minute walk test of 316± 95 meters, whereas the respiratory group recorded 279± 91 meters and the control group recorded 265± 53 meters. The Pranayama group's mean breath holding time was 11.7±2.4 seconds, while the Respiratory Physiotherapy group and the Control group recorded 10±2.3 and 10±1.5 seconds, respectively.

Table 5: Distance covered in six minute walk test and duration of breath holding time at baseline

Parameter	Pranayama group (n=52)	Respiratory physiotherapy group (n=50)	Control group (n=31)	p value
6 Minute Walk Test (m)†	316 ±95	279 ±91	265 ± 53	.024
Breath Holding Time (sec) †	11.7 ±2.4	10.0 ±2.3	10.0 ±1.5	.001

The percentage of participants taking corticosteroids and bronchodilators is displayed in Table. Despite the fact that a smaller proportion of participants in the control group were taking corticosteroids, the majority of subjects across all categories were prescribed bronchodilators and corticosteroids. The percentage of participants who experienced acute exacerbations six weeks prior to baseline examinations is also displayed in the table.

6. Conclusion

Airflow restriction, bronchial hyperresponsiveness, and underlying inflammation interact intricately in bronchial asthma, a prevalent chronic respiratory condition. Although symptoms of asthma are episodic, persistent inflammation of the airways persists; yet, the correlation between the severity of asthma and the degree of inflammation remains unclear.

A sizable amount of research supports the use of yoga in the treatment of persistent bronchial asthma. The impact of breathing exercises on pulmonary function indices, quality of life, airway hyperreactivity, medication use, and attack frequency has been the subject of numerous studies, which have been reported. Nevertheless, none of this research have looked into how breathing exercises, or in this case, Pranayama alone, affect pulmonary functioning or the pathophysiology of bronchial asthma. In order to determine the effectiveness of breathing exercises for people with chronic bronchial asthma, the current study was carried out.

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