

Effectiveness of selected Yoga postures and procedures for improvement in pulmonary functions in 8-14 year old children of Nasobronchial allergy

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Abstract

Introduction: Yoga postures can be effective way to regularize immune functions. Nasobronchial allergy appears when immune mechanisms go haywire and start behaving autonomously. Yoga has been used in many centers in India to cure asthma and other allergic ailments. This systematic prospective control trial study was done on school going children of Amritsar District., India. **Material & Methods:** Study done on 150 school going 8-14 year old children taken from Paediatrics ward of GND hospital, Amritsar. 75 children were included in study group and another 75 children were taken as controls. Both study and control group was further divided into three groups each. Sub-group-A- Allergic Rhinitis, Sub-group-B- Bronchial Asthma, Sub-group-C- Allergic Rhinitis and Bronchial Asthma both. Study group were taught certain Yoga postures like Virassna, Stupassna etc. and were followed for 6-12 weeks and results were recorded at 0, 6 and 12 weeks. Pulmonary functions tests were done on computerized spirometer. **Results:** In sub-group A and B highly significant ($p < 0.001$) results were seen in study group in terms of improvements in FVC, FEV1 and PEFR as compared to control group. **Conclusion:** Yoga postures and its variant breathing exercises can effectively improve pulmonary functions and modulate immune functions for cure of allergy.

Key words: Nasobronchial Allergy, Yoga, Asthma, Rhinitis, Virassna, Stupassna, Pulmonary functions.

Introduction

Yoga is a spiritual discipline. In scientific terms it balances the axis of "mind-body-spirit". For centuries this has been used as therapeutic intervention for number of disease related to physical and mental components of the body. The first systematic application of Yoga started in 1918 at the Yoga Institute of Versova (Mumbai). This was precursor of Yoga Institute at Santa Cruz [1]. Yoga therapy is novel and emerging clinical discipline in a broad category of Mind body Medicine. Many studies have been undertaken by various researchers to study the role of Yoga on Nasobronchial allergy. There are reports of both good and limited effect of Yoga on Asthma which is the major outcome of Naso-bronchial allergy [2]. Goyeche

et al and several others have reported the convincing evidences of beneficial effect of Yoga on respiratory allergies [3].

Allergic rhinitis involves inflammation of mucous membranes of nose, eyes, Eustachian tubes, middle ear, sinuses and pharynx. Nose is invariably involved and other organs are affected more or less in different individuals. This inflammation is complex interaction of inflammatory mediators but ultimately triggered by Immunoglobulin E (IgE)-mediated response to an extrinsic protein [4]. Systemic effects of such an allergic reaction include fatigue, malaise, sleeplessness etc. These symptoms impair the quality of life. Although allergic rhinitis is a common disease but its impact on daily life cannot be underestimated. Some patients find it quite debilitating and intrusive as severe

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asthma. Employees with untreated allergies are reportedly 10% less productive than other co workers where as those using allergic medicines to tract allergic rhinitis are 3% less productive [5]. Allergic rhinitis affect near 40 million people in the US [6,7] and recent figures suggest a 20% cumulative prevalence rate [8,9,10,11]. In the Tucson study, it was found that 42% of children had rhinitis at 6 year of age and perennial rhinitis is more common in adults than in children though few reliable data exists [12,13].

Prevalence of allergic rhinitis in 2006 was 12.55% in rural and 11.38% in urban adults of Delhi. The prevalence of rhinitis in children was 7.3% and in industrial workers as 17.5% [14].

Interactions between the lower and upper airways are well known and have been extensively studied since 1990. Over 80% of asthmatics have rhinitis and 10-40%

with rhinitis have asthma [15]. Most patients with asthma have rhinitis suggesting the concept of one airway one disease although there are patho-physiological differences between rhinitis and asthma [16,17,18].

Asthma and Allergic Rhinitis may develop concurrently or even sequentially and both have similar natural histories and exacerbation [19]. Poor outdoor air quality, exposure to indoor allergens and a stressful lifestyle has been connected with the prevalence of asthma and allergic rhino-conjunctivitis [20].

Yoga is union of deep cognitive principle in us with the body. Breathing exercise or Pranayama are most important part of Ashtang yoga. These strengthen the respiratory muscles and minimize or eliminate the use of accessory muscles of respiration. By deep respiration we reduce chances of hyperventilation [21].

Material and Methods

This randomized controlled trial study was conducted in 150 children of both sexes from 8-14 year of age suffering from already diagnosed Naso-bronchial Allergy. These children was taken from Paediatrics OPD department of Guru Nanak Dev Hospital, Amritsar (India) a well known tertiary care Government run hospital in northern India. These children and parents were explained the procedure and informed consent was taken.

Subjects were divided in two main groups and three subgroups

Group A- Study group (75 children). These children were taught Yogic postures and procedures and were selected after they learnt effectively and consented to follow all requisite guidance and were followed up for 6 weeks Yoga therapy as an adjuvant to medical management.

Group B- Control group (75 children). These children were monitored for their medical management only. Three Subgroups were created for management purpose primarily as under:

Main Group	Group I	Group II	Group III
Study Group (A)	Children suffering from Allergic Rhinitis only	Children suffering from Allergic Bronchial Asthma only	Children suffering from both Allergic Rhinitis and Allergic Bronchial Asthma
Control Group (B)	Children suffering from Allergic Rhinitis only	Children suffering from Allergic Bronchial Asthma only	Children suffering from both Allergic Rhinitis and Allergic Bronchial Asthma

Yoga Procedures: Subjects of Group A (Study Group) were carefully to look for other cardiovascular causes of breathlessness like congenital heart disease and they were excluded from study. Patients of acute and chronic respiratory infections, vertebral deformities like kyphosis and scoliosis were also excluded. All other non respiratory causes of allergy like skin and food allergy were also excluded. Subjects were given an integrated course on Yogic lifestyle based on principals of Yoga. They were taught Nadishodhana and Ujjayi Pranayama and yoga postures like Virassna, Suptassna, Supta Baddhakonassna, Tadassna, Bhujangassna, Gomukhassna, Shavassna and Makarassna. These assnas or postures have been documented in Yoga literature for cure of asthma and other respiratory ailments. The Children of

both study and control groups were followed up for 6 weeks and their pulmonary functions tests were recorded at 0 and 6 weeks. These complimentary methods were used as adjunct and pharmacological treatment was not stopped during acute attacks.

The selected children in both the groups underwent routine hemogram including eosinophil count, pulse rate, respiratory rate, blood pressure examination. The frequency of rescue medicine was also recorded. After that their spirometer indices of pulmonary functions were examined and recorded as baseline data at 0 week. An "asthma quality of life questionnaire (AQLQ) were made available to children of both groups in their vernacular language [22].

The study group children were told and taught to follow "Yoga life style" which means to have Assna and Pranayama routine every morning for half to one hour. They were advised to avoid highly spicy and oily foods and get more water, fruits and vegetables in their routine diet. But their diet part was not monitored. All data was recorded once again after 6 weeks and later after 12 weeks.

Statistical Analysis: The data was analyzed using computer software MS Excel statistical package of social sciences (SPSS version 10.0). Mean and standard deviation were calculated and recorded for quantifiable variables. The statistical differences in mean value were tested using ANOVA (Analysis of variance) with post-hoc turkey. A p-value of <0.05 was considered statistically significant and <0.001 was considered highly significant.

Observations and Results

Table I- Sex wise distribution of subjects in yoga and control group

n=75 each

Groups	Yoga Group (A)		%age		Control Group (B)		%age	
	Male	Female	Male	Female	Male	Female	Male	Female
	55	0	72	28	53	22	80	20

Table-I shows the equal distribution of cases in both groups

Table-II- Statistical data of pulmonary functions tests in both groups.

Parameter	Group	0 week	6 week	Paired t-value	p-value	Significance
FVC	B (Control)	74.65±18.78	75.32±18.60	1.329	0.196	NS
	A (Yoga)	75.51±16.73	77.30±17.09	4.38	0.001	S*
FEV1	B (Control)	70.60±17.77	71.42±17.81	1.866	0.074	NS
	A (Yoga)	72.42±16.31	74.30±15.36	4.987	0.001	S*
PFER	B (Control)	71.48±17.18	71.60±15.63	0.220	0.828	NS
	A (Yoga)	74.80±16.24	76.68±15.81	0.457	0.652	NS
MVV	B (Control)	50.72±12.88	52.32±11.57	3.411	0.002	S*
	A (Yoga)	53.89±13.93	57.92±14.20	4.869	0.001	S*
FEV1/FVC%	B (Control)	94.59±3.11	94.85±4.88	0.309	0.760	NS
	A (Yoga)	95.84±2.12	96.48±4.42	0.210	0.836	NS

Data given are mean ±Standard deviation of percentage of the predicted value of both the groups.

Table II shows Pulmonary functions tests (% of predicted) of both Yoga and Non-Yoga group at 0, 6 and 12 weeks of follow up. Mean FVC, FEV1 and MVV of both groups improved significantly after 12 weeks of strict Yoga regimen. (p value <0.001 and <0.05). The follow up of PFER gave non-significant results. Ratio of FEV1/FVC% was also non significant in both groups. The quality of life evaluation based on AQLQ also showed significant improvement in Yoga group.

Discussion

Allergic Rhinitis is major chronic respiratory disease and with its link to Bronchial asthma causes grave impact on quality of life, work and school performance as well as causes economic burden on family and state. Rhinitis and asthma appear to be interrelated at epidemiological and patho-physiological level. They are frequently associated with atopy and preferential sensitization to airborne allergens. It is accepted and well understood that both allergic rhinitis (AR) and bronchial asthma (BA) are inflammatory disease. Inflammatory mechanisms are similar; in terms of infiltration by cells - eosinophils, T cells, and mast cells, release mediators and IgE -local and systemic. Hence "One airway – One disease" is acceptable patho-physiology behind [23] and warrants equal management of both.

In allergic rhinitis, this immediate reaction leads to nasal congestion and runny nose from an increase in vascular permeability. In asthma, the immediate reaction results in broncho-spasm. Late-phase reaction occurs in both asthma and rhinitis following allergen exposure and is mainly triggered by CD4⁺ T cells [24]. Allergic rhinitis and asthma share many pathologic features. In fact, the same profile of inflammation, mediators, and adhesion molecules can be observed in upper- and lower-airway allergic diseases.

Studies show that clinical spectrum of Asthma and rhinitis though variable but presence of airway inflammation remains a consistent feature [25].

The normal response to an aeroallergen is the production of immune-globulins or antibodies to the allergens. Some individuals appear to be genetically predisposed to produce more IgE, in particular, in response to an allergen. The individual once sensitized to this allergen, and many allergen-specific IgE molecules attach themselves to mast cells in the protective tissues, particularly in the mucous membranes [26].

Along with mast cells, numerous other inflammatory cells exist in the mucous membranes. The airway

inflammatory process involving several cell types in patients with an early diagnosis of asthma; these cells, (CD4⁺ T cells, macrophages, B cells, basophils and neutrophils) are essential in the immune reaction [27].

Patients of allergic rhinitis have a threefold greater chances of developing asthma. Interestingly relief of rhinitis symptoms or improvements of allergy correlates with improvement of asthma symptoms [28]. Pulmonary functions in children play an important role in evaluation of a child with known or suspected pulmonary disease. These are recommended by National Asthma Education and Prevention Program (NAEPP) and Global Initiative for Asthma (GINA) in assessment and long term monitoring of patients with asthma [29].

Practice of Yoga is an inexpensive and safe methodology for prevention of many systemic diseases. We found highly significant results of prevention as well as cure of both Allergic Rhinitis and Bronchial Asthma after follow up of 6 weeks performance of Yoga postures and Pranayama exercises.

Mean values of Peak Expiratory Flow Rate (PFER) in non yoga subgroup were 71.48±17.18 initially and 71.60±15.63 at 6 weeks interval. For Yoga group these values were 74.80±16.24 at baseline and 76.68±15.81 after 6 weeks. These values are non-significant statistically both groups.

Mean values of Maximum Voluntary Ventilation (MVV) in non yoga subgroup were 50.72±12.88 initially and 52.32±11.57 at 6 weeks interval. For Yoga group these values were 53.89±13.93 at baseline and 57.92±14.20 after 6 weeks. These values are significant statistically in both groups.

Mean values of (FEV1/FVC) ratio of non yoga subgroup were 94.59±3.11 initially and 94.85±4.88 at 6 weeks interval. For Yoga group these values were 95.84±2.12 at baseline and 96.48±4.42 after 6 weeks. These values are non-significant statistically in both groups.

Our study found that spirometric parameters were deranged in majority of subjects suffering from Allergic Rhinitis. FVC, FEV1 and MVV increased significantly while little effect was seen in PFER and FEV1/FVC% ratio.

Our results were in agreement with the study conducted by Ciprandi G. et al. They highlighted the close link between upper and lower airways [30].

Our study is also in agreement with study conducted by Murthy et al [31] who reported significant increase in PFER and FEV1 after performance of Yoga and breathing exercises in children. We are in partial agreement with Kumar et al [32] who found no significant difference in PFER after pranayama but FEV1/FEV ration increased after pranayama. Perhaps this was due to less period of study (6 weeks) taken for performance of yoga exercises and evaluation of results.

However our study is in disagreement with work done by Manocha et al [33], who reported that sahaj yoga as compared with group therapy and relaxation has no effect on symptoms or use of rescue medicines and asthma related QOL.

We conclude that Yoga especially the breathing exercises (Pranayama) when used as an adjunct to standard pharmacotherapy can significantly improve some of pulmonary functions and substantially improve allergic manifestations of nasobronchial allergy. Possible reason for this might be due to direct enhanced broncho-dilatory effect of Yoga on sympatho-vagal tone.

Conclusions and Summary

Allergic Rhinitis and Bronchial Asthma groups selected for study showed significant improvements in pulmonary functions tests, FVC, FEV1, PEFr and MVV after 6 weeks of Yoga and pranayama therapy.

All parameters of Quality of life also improved significantly. We conclude that Yoga postures and breathing exercises and Pranayama when used as an adjunct to standard pharmacological treatment can significantly improve some of the pulmonary functions and substantially improve quality of life in children suffering from Naso-bronchial Allergy. Possible reason may be due to direct enhanced broncho-dilatory effect of Yoga exercises due to improved sympatho-vagal tone.

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