



**ASSESSMENT OF YOGA AND ANTIOXIDANT STATUS IN ASTHMA PATIENTS: A
RANDOMIZED CONTROLLED STUDY**

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ABSTRACT

Background and Objective: Asthma is really the serious health problem of the community. It is affecting people of all ages. A lot of studies have been done in this field but the impact of yoga on antioxidants in asthmatics is negotiable. The current study is a value based study done on a large number of asthma patients for 6month period. It attempted to show the efficacy of yoga in bronchial asthma. **Setting and Design:** It was a randomized controlled trial carried out in from the Department of Respiratory Medicine, King George's Medical University, U.P., Lucknow, India. **Methods and Materials:** The study was carried out in mild to moderate persistent asthma patients aged between 12 to 60 years. The patients were recruited from the department of Respiratory Medicine; patients were randomly divided into two groups: 'the case group and 'the control group'. **Statistical Analysis Used:** The Statistical analysis was done by using GraphPadInStat version 3.05 software Inc, year 2000 (Version. 3.05 GraphPad software, Inc., California). **Results and Conclusion:** There was significant improvement found in the proportion of Superoxide dismutase, Glutathione and Catalase in comparison to the control group. Result shows that yoga can be used as an adjuvant therapy with standard medical treatment for the better management of asthma.

KEYWORDS: Adjuvant; asthma; moderate; wheezing.

INTRODUCTION

Asthma is a chronic inflammatory lung disease that results in airflow limitation, hyper- reactivity, and airway remodeling. There is strong evidence that an imbalance between the reducing and oxidizing systems favoring a more oxidative state is present in this disease. In bronchial asthma, oxidative stress aggravates airway inflammation by inducing diverse pro- inflammatory mediators, enhancing bronchial hyper- responsiveness, stimulating bronchospasm, and increasing mucin secretion.^[1]

Yoga and health both are complementary to each other because yoga can be done by the healthy person and health can be achieved by the regular practice of yoga. Because of this people of all the groups and community have accepted it for the development of physical, mental and spiritual health.^[2] According to Mahrishi Patanjali "Yoga is the total cessation of modalities of mind". The word yoga is originated from "yuj dhatu" in Sanskrit literature which means to join or together the mind, body and spirit. The aim of yoga for health is to bring balance into the body physically, mentally and emotionally. By connecting to ourselves through the breath, we can bring our bodies from a state of "dis-ease" to a place of health. Yoga is an antidote for stress, and a potentially powerful complement to live a healthy balanced life.^[3]

Oxidative stress is considered to be a toxic byproduct of aerobic metabolism and a factor involved in tissue damage. The results of many recent studies have been shown that compounds involved in oxidative stress act as key molecules in signal transduction.^[4]

Recent research suggests that airway inflammation is the most proximate cause of the recurrent episodes of airflow limitation in asthma and is associated with increased oxidative stress. Thus, oxidative stress (oxidant-antioxidant imbalance) has been increasingly recognized as a major factor contributing to the chronic inflammation.^[5-8]

Glutathione reductase (GR) also known as glutathione-disulfide reductase (GSR) is an enzyme that in humans is encoded by the GSR gene. Glutathione reductase catalyzes the reduction of glutathione disulfide (GSSG) to the sulfhydryl form.^[9-11]

Yoga has considered as a form of Complementary and Alternative Medicines.^[12] While beutyko technique (breathing exercise) has been accepted by GINA (Global Initiative for Asthma) in asthma treatment. Therefore, regular practice of yoga provides strength, endurance, flexibility and facilitates characteristics of friendliness, compassion, and greater self-control, while cultivating a

sense of calmness and well-being.^[13-14] Attack of asthma involves both physical and psychological factors. The exhalation is an important technique in managing asthma and reducing frequency and intensity of asthma attacks.^[15] By regular practice of yogasanas and pranayama the constriction of bronchial tubes get very much reduced. Slowly the capacity of bronchial tubes increases to a great extent and subsequently gradually asthma can be cured from roots.

MATERIALS AND METHODS

This study was a randomized controlled trial, conducted in the Department of Respiratory Medicine, King George's Medical University, U.P., Lucknow, India. Diagnosed cases of asthma were recruited from the Out Patient Department (OPD) of the department and screened by a consultant for the participation in the study on the basis of inclusion & exclusion criteria. The "Patients having mild to moderate persistent bronchial asthma severity according to GINA (Global Initiative for Asthma) 2014, with age ranging from 12-60 years were included in the study". They were non-smokers or ex-smokers who have not smoked for at least 6 months and reversible airflow limitation $>12\%$ & ≥ 200 mL (Post Bronchodilator $FEV_1 >12\%$ & ≥ 200 mL). Patients with severe airflow limitation or more ($FEV_1 < 60\%$), Pregnant or lactating women, any associated chronic respiratory diseases and having major psychiatric illnesses and current smokers were excluded". This study was approved by the Institutional Ethics Committee of the King George's Medical University, U.P., Lucknow.

A total of 400 subjects who satisfied the inclusion criteria were allocated into two groups on the basis of computer generated random number table. They were divided into two groups, yoga group who received yogic intervention for 6 months along with standard medical treatment and control group who received only standard medical treatment. Out of 400 subjects (200 cases and 200 controls), 42 subjects from the yoga group and 40 subjects from the control group dropped out during the study period. 158 subjects of the yoga group and 160 subjects of the control group completed the study successfully.

Peripheral venous blood (5 mL) was taken for the study of biochemical changes occurred at baseline and after 6 months. Blood was taken without using an anticoagulant and allowed the blood to clot for 30 min at 25°C, and then centrifuge the blood at $2,000 \times g$ for 15 min at 4°C. Pipette off the top yellow serum layer without disturbing the white buffy layer. Now stored this serum at 80°C until bio-chemical measurements were taken.

Yogic Intervention- Subjects in the yoga group received yogic intervention (asanas, pranayama & meditation) for 30 min per day, five days in a week for a period of six months at Department of Respiratory Medicine, King George's Medical University, U.P., Lucknow [Table 1].

Data Analysis- Paired (dependent) *t*-test was used to test the mean difference score of the subjects at baseline and after 6 months in both groups, i.e., yoga/intervention and control group. The Statistical analysis was done by using GraphPadInStat version 3.05 software Inc, year 2000 (Version. 3.05 GraphPad software, Inc., California).

RESULTS

Biochemical variables at baseline in between group comparison are given in Table 2. Both groups are comparable in every respect and there was no significant difference found in any variable. The values of outcome measures are given in Table 3 and 4.

Between groups comparisons are given in Table 3 and 4 after 6 month to the yoga intervention. There was significant difference found in all the biochemical variables at 6th month in between group comparison [Table 3]. At post- intervention, between group differences were found highly significant with better improvement in antioxidant levels. [Table 4].

Comparison of pre and post changes occurred in yoga group and control group at 6th month respectively after the intervention of yoga to the yoga group are given in Table 4. As seen in Table 4, both groups have significant improvement at 6th month. There was 22.13% change was found in yoga group while 3.40% change was found in control group in SOD level. 17.4% and 3.31% change were found in yoga as well as control group respectively in Glutathione reductase level while 16.73% and 8.53% change were found in yoga as well as control group respectively in catalase level.

Yogic Techniques	Duration (min)
Asanas	
Gomukhasana (sitting posture)	2
Ardhamatsyendrasana (sitting posture)	2
Paschimmottanasana (forward bending)	0.5
Bhujangasana (backward bending)	0.5
Dhanurasana (backward bending)	0.5
Naukasana (boat pose asana)	1
Parvatasana (standing posture)	1
Tadasana (standing posture)	0.5
Shavasana (relaxing/resting asana)	5
Pranayama	
Nadishodhana	3
Bhastrika	2
Bhramari	2
Meditation	10
Total Duration	30 min

Parameters	Cases	Controls	Effect Size	P value	t- statistics
	N=142, Mean± SD	N=140, Mean± SD			
SOD	12.65 ± 5.25	11.75 ± 3.27	0.25	0.55	5.25
Glutathione Reductase	75.45± 5.36	79.64 ± 6.50	1.8	0.65	2.25
Catalase	4655.56 ± 215.51	4826.35 ± 205.12	0.65	0.08	1.68

SD-Standard deviation; SOD-Superoxide dismutase
P value significant (5% level of significance)
P value not significant (>0.05) for any of the parameter.

Parameters	Cases	Controls	Effect Size	P value	t- statistics
	N=142, Mean ± SD	N=140, Mean ± SD			
SOD	15.45 ± 7.56	12.15 ± 4.85	0.82	<0.0001	5.62
Glutathine Reductase	88.65 ± 8.25	82.28 ± 7.24	0.52	0.045	2.54
Catalase	5425.54 ± 558.62	5247.85 ± 441.25	1.82	0.56	1.25

SOD-Superoxide dismutase
 **P* value significant (5% level of significance)
P value not significant (>0.05) for any of the parameter.

Table 4: Comparison of pre- post biochemical changes occurred in ‘the yoga group’ and ‘the control group’.

Parameters	YOGA GROUP					CONTROL GROUP				
	Baseline	After 6 month	% change	t statistics	P value	Baseline	After 6 month	% change	t- statistics	P value
SOD	12.65 ± 5.25	15.45 ± 7.56	22.13	5.86	<0.0001	11.75 ± 3.27	12.15 ± 4.85	3.40	4.62	0.005**
Glutathione Reductase	75.45± 5.36	88.65 ± 8.25	17.49	4.58	0.001**	79.64 ± 6.50	82.28 ± 7.24	3.31	5.02	0.003**
Catalase	4655.56 ±215.51	5425.54 ±558.62	16.53	18.25	<0.0001	4826.35 ± 205.12	5247.85±441.25	8.73	10.54	0.02*

Hb-Hemoglobin; TLC-Total leukocyte count; SOD-Superoxide dismutase
 * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$ based on *post hoc* pair-wise comparison with baseline values.
 P- value not significant (>0.05) for any of the parameter.

DISCUSSION

The results of this study suggest that both groups got significant improvement in 6- month study period compared to baseline scores, but the improvement was achieved relatively earlier by the yoga group in comparison to control group. Between group differences at 6th month were found highly significant with better improvement in all the variables.

The antioxidants prevented the consumption of oxygen in the cells and helps in decreasing the symptoms of asthma while free radicals promote asthma to increase the consumption of oxygen. SOD is a scavenging enzyme, has the capacity to scavenge the superoxide radical. Hence, it helps in prevention of consumption of oxygen and cellular damage. A study done on asthmatics concluded that SOD level increases in asthmatic patients who have done regular practice of yoga for 6-month.^[16]

Glutathione reductase is a critical molecule in resisting oxidative stress and maintaining the reducing environment of the cell. A study also suggested that free radicals may be involved in the development of pulmonary disorders including asthma.^[17] However, probably none of the randomized controlled study has shown the impact of yoga on antioxidant status of asthmatics as done in the current study.

CONCLUSION

The study concluded that yoga is an effective tool to improve the antioxidant status in asthma patients and asthma symptoms can be controlled with regular practice of yoga. It can be practice as an adjuvant therapy with standard inhalation therapy.

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Conflicts of interest

There is no conflict of interest.

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