Original Article

Assessment of significance of *Yoga* on quality of life in asthma patients: A randomized controlled study

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Abstract

Background: Asthma is a chronic inflammatory respiratory disease characterized by periodic attacks of wheezing, shortness of breath and a tight feeling in the chest. The current study is based on the effect of *Yoga* on quality of life in asthmatics in Northern India. **Materials and Methods:** A total of 300 participants of mild-to-moderate persistent asthma (FEV_1 >60%) aged between 12 and 60 years were recruited from the Department of Pulmonary Medicine. Their quality of life was assessed with the help of mini asthma quality-of-life questionnaire (AQLQ) at baseline and then after 3rd and 6th month from baseline. Forty-five participants were dropped out during the study while 255 participants completed the study successfully. **Results:** In "the *Yoga* group," significant improvements were found in all the subdomains of AQLQ at 3rd month and at 6th month in comparison to "the control group." The number needed to treat was found to be 2.67 for the total AQLQ score which was greater than the minimal important difference. **Conclusion:** "The *Yoga* group" got significantly better improvement in asthma quality-of-life scores than "the control group." Thus, *Yoga* can be used as an adjuvant therapy in the management of asthma.

Keywords: Adjuvant, asthma, chronic, quality of life, wheezing

Introduction

Asthma is a chronic inflammatory disorder of the airways in which many cells play a role, including mast cells and eosinophils. In susceptible individuals, this inflammation causes symptoms which are usually associated with widespread, but variable, airflow obstruction that is often reversible either spontaneously or with treatment and causes an associated increase in airway responsiveness to a variety of stimuli.[1]

Yoga has been considered as a form of complementary and alternative medicines.[2] It is originated from a Sanskrit root "*Yuj*" which means union or yoke, to join and to direct and concentrate one's attention.[3] Regular practice of *Yoga* provides strength, endurance and flexibility and facilitates characteristics of friendliness, compassion and greater self-control while cultivating a sense of calmness and well-being.[4] *Yoga* is known for its beneficial effects on physiological and psychological functions and improves the quality of life of the patients.[5] Quality of life is also concerned with the asthmatic patients so that the present study is based on mild-to-moderate persistent asthma patients to know the effect of *Yoga* on asthma quality of life. However, the effect of *Yoga* on quality of life of asthmatic patients has not been studied. The present study is based on the findings of one of the aims of the larger study on bronchial asthma.

Materials and Methods

Study design and setting

It was a randomized controlled trial which was conducted in the Department of Pulmonary Medicine. Diagnosed patients of asthma were recruited for the study and randomized into two groups on the basis of computer-generated random number table using Graph Pad in stat version 3.05 software Inc., 2000 (Version. 3.05 GraphPad Software, Inc., California, USA). The patients of asthma were recruited at the time of selection irrespective to allergic status during the study. The study was

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approved by the Institutional Ethics Committee of the King George's Medical University, Lucknow, Uttar Pradesh. Signed informed consent was obtained from all the participants before being enrolled for the study. They were free to withdraw from the study at any stage of the study period without assigning any reason.

Inclusion criteria

The patients were included in the study having mild-to-moderate persistent bronchial asthma severity according to the GINA-2011, aged ranging between 12 and 60 years. They were nonsmokers or exsmokers who have not smoked for at least 6 months and reversible airflow limitation >12% and >200 mL (postbronchodilator FEV_1 >12% and >200 mL).

Exclusion criteria

Patients were excluded 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.

Study participants

In this randomized controlled trial, 300 participants who satisfied the inclusion criteria were allocated into two groups: "the *Yoga* group" and "the control group." Of 300 participants (150 cases and 150 controls), 25 participants from the *Yoga* group and 20 participants from the control group dropped out during the study. A total of 125 participants from "the *Yoga* group" and 130 participants from "the control group" completed the study.

Yogic intervention

Participants in "the *Yoga* group" received yogic intervention (*Asanas, Pranayama* and meditation) for 30 min per day, 5 days in a week for 6 months in the Department of Pulmonary Medicine [Table 1]. During the follow-up of the study, patients of "the *Yoga* group" and the "non-*Yoga* group" had taken the standard medication according to the GINA guidelines (inhaled corticosteroid with LABA combination and inhaled β-2 agonist).

Assessment criteria

Quality of life was measured using a self-administered mini asthma quality-of-life questionnaire (AQLQ by Elizabeth Juniper, England) which is available in bilingual form, that is, English and Hindi. Mini AQLQ is 15-item disease-specific questionnaire that has been validated to measure the problems in the patients of asthma which they experience in their daily lives. Patients responded to each question on a 7-point scale, 1 being maximum impairment while 7 being no impairment. The overall quality-of-life score is the mean score of all the 15 questions of the Mini AQLQ. The 15 questions of the questionnaire are further grouped into four subdomains (symptoms, activity limitation, emotional function and reactivity to environmental stimuli). The score for each subdomain was also calculated as the mean score for items pertaining to the related subdomain. Thus, the score may also vary from 1 to 7.

Table 1: *Yoga* module for *Yoga* group

Yogic techniques	Duration (min)
Asanas	
Gomukhasana (cow face pose)	2
Ardhamatsyendrasana (half spinal twist pose)	2
Paschimmottanasana (seated forward bend pose)	0.5
Bhujangasana (cobra pose)	0.5
Dhanurasana (bow pose)	0.5
Naukasana (boat pose asana)	1
Parvatasana (mountain pose sitting posture)	1
Tadasana (mountain pose standing posture)	0.5
Shavasana (corpse pose/relaxing asana)	5
Pranayama	
Nadishodhana (alternate nostril breathing)	3
Bhastrika (the bellows breath)	2
Bhramari (bee breathing)	2
Meditation	10
Total duration	30

Statistical analysis

Paired *t*-test was used to test the mean difference score of the participants at baseline and after 3 months and 6 months in both groups, that is, *Yoga* and control groups. Student's independent sample *t*-test was used to compare the differences in scores between *Yoga* and non-*Yoga* group. Differences were considered statistically significant if $P < 0.05$. The statistical analysis was done using Graph Pad In Stat version 3.05 software Inc., 2000 (Version. 3.05 Graph Pad Software, Inc., California, USA).

A change of >0.05 in the AQLQ score has been considered the minimal important difference (MID) as clinically meaningful difference.[6] Based on MID, the number needed to treat (NNT) was calculated by clinically useful measures of the consequences of treatment.[7]

Results

Asthma quality-of-life scores at baseline in "between-group comparison" are given in Table 2. Both groups are comparable in every respect and no significant differences were found in any subdomain of the quality of life. The values of outcome measures are given in Tables 3-6.

"Between-group comparisons" are given in Tables 3 and 4 at 3rd month and 6th month, respectively, after the intervention of *Yoga* to "the *Yoga* group." The significant differences were found in subdomain activity limitation and emotional function score at 3rd month [Table 3] and the significant difference was found in the total quality of life with all its subdomains at 6th month. At postintervention, "between-group differences" were found highly significant with better improvements in symptom score, activity limitation score, emotional function score, response to environmental stimuli and total quality-of-life score [Table 4].

Comparison of pre- and post-asthma quality-of-life changes occurred in "the *Yoga* group" and "the control group" at

Table 2: Baseline scores of cases and controls (between group)

Variables	Mean±SD		Effect size	*P*	*t*-statistics
	Cases (*n*=125)	Controls (*n*=130)			
Symptoms	3.68±0.91	3.52±0.72	0.19	0.13	1.51
Activity limitation	3.56±0.51	3.51±0.64	0.09	0.50	0.67
Emotional function	3.21±1.22	3.17±0.93	0.04	0.78	0.29
Response to environmental stimuli	3.20±0.40	3.13±0.28	0.20	0.12	1.57
Total quality of life	3.45±0.73	3.37±0.61	0.12	0.38	0.92

P value not significant (>0.05) for any of the parameter. SD: Standard deviation

Table 3: Scores of cases and controls at 3rd month (between group)

Variables	Mean±SD		Effect size	*P*	*t*-statistics
	Cases (*n*=125)	Controls (*n*=130)			
Symptoms	4.75±0.75	4.63±0.61	0.18	0.17	1.36
Activity limitation	5.08±0.30	4.85±0.43	0.62	<0.0001	4.82
Emotional function	5.49±0.58	5.31±0.40	0.36	0.006**	2.80
Response to environmental stimuli	4.43±0.31	4.48±0.61	0.10	0.42	0.80
Total quality of life	4.92±0.62	4.79±0.56	0.22	0.09	1.71

*P*** value not significant (>0.05) for any of the parameter. *P** value significant (5% level of significance). SD: Standard deviation

Table 4: Scores of cases and controls at 6th month

Variables	Mean±SD		Effect size	*P*	*t*-statistics
	Cases (*n*=125)	Controls (*n*=130)			
Symptoms	5.61±0.45	5.32±0.32	0.74	<0.0001	5.76
Activity limitation	6.07±0.21	5.75±0.26	1.35	<0.0001	10.51
Emotional function	5.74±0.39	5.27±0.41	1.17	<0.0001	9.12
Response to environmental stimuli	5.44±0.06	5.31±0.16	1.07	<0.0001	8.36
Total quality of life	5.72±0.38	5.43±0.34	0.80	<0.0001	6.24

P value not significant (>0.05) for any of the parameter. SD: Standard deviation

3rd month and 6th month, respectively, after the intervention of *Yoga* to "the *Yoga* group" are given in Tables 5 and 6. It was observed in pre- and post-comparison at 3rd month in "the *Yoga* group" that symptom score increased by 29.07% from 3.68 ± 0.91 to 4.75 ± 0.75 ($P = 0.11$), but it was not statistically significant. Activity limitation score was increased significantly by 42.7% from 3.56 ± 0.51 to 5.08 ± 0.30 ($P = 0.02$). There was a significant increase of 71.03% found in emotional function score from 3.21 ± 1.22 to 5.49 ± 0.58 ($P = 0.028$). Response to environmental stimuli increased significantly by 38.87% from 3.20 ± 0.40 to 4.43 ± 0.31 ($P = 0.012$) and total score by 49.09% from 3.45 ± 0.73 to 4.92 ± 0.62 ($P < 0.0001$).

The AQLQ scores showed an improvement over the 6-month study period in both groups. However, the improvement was achieved earlier and was more complete in the *Yoga* group. At 3rd month, the improvement was statistically significant as compared to the baseline score in the total quality of life and its subdomains in the *Yoga* group except symptom scores but not in the control group.

Although significant improvement in total quality-of-life score was observed in both case and control groups [Table 6], but the magnitude of improvement was much more in the participants of the group that regularly practiced *Yoga* along with standard medication. In the *Yoga* group, symptom score increased significantly by 52.45% from 3.68 ± 0.91 to 5.61 ± 0.45 ($P = 0.005$). Activity limitation score was increased significantly by 70.51% from 3.56 ± 0.51 to 6.07 ± 0.21 ($P = 0.001$). There was significant increase of 78.82% in emotional function score from 3.21 ± 1.22 to 5.74 ± 0.39 ($P = 0.04$). Response to environmental stimuli increased significantly by 70% from 3.20 ± 0.40 to 5.44 ± 0.06 ($P = 0.009$) and total score by 73.33% from 3.45 ± 0.73 to 5.72 ± 0.38 ($P < 0.0001$). Control group also showed significant improvement in all the variables at 6th month of intervention. The symptom score and response to environmental stimuli showed a significant but small increase in both groups.

The NNT was found to be 2.67 for the total score, 4.12 for the symptom score, 3.63 for the activity limitation score, 4.13 for the emotional function score and 2.85 for the response to environmental stimuli score. It means that a minimum of 3.48 (i.e., four) participants will be needed to be treated with *Yogic* intervention along with standard medical treatment for one participant to have a clinically meaningful improvement

Table 5: Comparison of pre- and post-asthma quality-of-life changes occurred in *Yoga* group and control group after 3 months

	Yoga group					Control group				
Variables	**Baseline**	**After 3 months**	**Percentage change**	***t*-statistics**	***P***	**Baseline**	**After 3 months**	**Percentage change**	***t*-statistics**	***P***
Symptoms	3.68±0.91	4.75±0.75	29.07	2.07	0.11	3.52±0.72	4.63±0.61	31.53	2.64	0.06
Activity limitation	3.56±0.51	5.08±0.30	42.70	4.36	0.02*	3.51±0.64	4.85±0.43	38.18	2.83	0.07
Emotional function	3.21±1.22	5.49±0.58	71.03	5.77	0.028*	3.17±0.93	5.31±0.40	67.51	5.38	0.03*
Response to environmental stimuli	3.20±0.40	4.43±0.31	38.87	9.24	0.012*	3.13±0.28	4.48±0.61	69.65	21.8	0.002**
Total quality of life	3.45±0.73	4.92±0.38	45.09	6.67	<0.0001	3.37±0.61	4.79±0.56	48.29	6.51	<0.0001

*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

Table 6: Comparison of pre- and post-asthma quality-of-life changes occurred in *Yoga* group and control group after 6 months

	Yoga group					Control group				
Variables	**Baseline**	**After 6 months**	**Percentage change**	***t*-statistics**	***P***	**Baseline**	**After 6 months**	**Percentage change**	***t*-statistics**	***P***
Symptoms	3.68±0.91	5.61±0.45	52.45	5.52	0.005**	3.52±0.72	5.32±0.32	51.14	6.23	0.003**
Activity limitation	3.56±0.51	6.07±0.21	70.51	12.71	0.001**	3.51±0.64	5.75±0.26	63.82	5.85	0.01*
Emotional function	3.21±1.22	5.74±0.39	78.82	4.94	0.04*	3.17±0.93	5.27±0.41	66.25	5.35	0.03*
Response to environmental stimuli	3.20±0.40	5.44±0.06	70	10.23	0.009**	3.13±0.28	5.31±0.16	69.65	21.8	0.002**
Total quality of life	3.45±0.73	5.72±0.38	73.33	13.65	<0.0001	3.37±0.61	5.43±0.34	68.11	13.56	<0.0001

*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

in the quality of life over and above the improvement that the participant would have experienced with standard medical treatment alone.

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 "the control group." "Between-group differences" at 6th month were found highly significant with better improvement in symptom score, activity limitation score, emotional function score, response to environmental stimuli and total quality-of-life score.

A randomized controlled trial has shown that the practice of *Sahaja Yoga* does have limited beneficial effects on asthma. *Sahaja Yoga* is a traditional system of meditation based on *Yogic* principles which may be used for therapeutic purposes. Another study on Iyengar *Yoga*, a form of *Yoga* known for using props such as belts and blocks as aids in performing postures, conferred no appreciable benefit in mild-to-moderate asthma.[8]

Quality of life of asthma patients worsens due to worst asthma symptom scores. *Pranayama* is the flow of energy which energizes the mind and body both. In a previous study, it was found that *Pranayama* reduces stress, a common asthma trigger. Breathing techniques and improved control of breathing by *Yoga* may contribute to the control of asthma symptoms. Breathing exercises emphasized in *Yoga* have the potential to improve lung function and quality of life in persons with asthma.[9,10]

Regular practice of *Yoga* is good to achieve complete health. It provides relaxation of mind, energizes the body and improves the quality of life of the asthmatic patients. Effectiveness of relaxation therapy has been studied in a group of asthmatics; they found mental relaxation to be more effective than muscular relaxation in the improvement of pulmonary function and subjective measures.[11] The *Yogic* practices including *Pranayama* on asthmatic patients reported a significant degree of relaxation, positive attitude toward asthma and exercise tolerance. The study also showed a tendency toward lesser usage of beta-adrenergic inhalers.[12]

In a randomized controlled trial, there was a significant improvement found in AQLQ scores in both groups, but the improvement was more in *Yoga* group.[13] It supports our findings, but it was a short-term study and small number of patients being studied. However, probably, none of the study has shown the effect of *Yoga* on quality of life in asthma patients in India as done in the current study.

Conclusion

The current study shows that the *Yogic* intervention improved the status of quality of life. All the subdomains of quality of life including total scores significantly increased in both groups but

the *Yoga* group in comparison to the control group achieved the improvement relatively earlier. Overall, this study shows that *Yoga* is an effective tool to improve the quality of life and it can be practiced as an adjuvant therapy to standard medical treatment for a better outcome of asthma.

Suggestions for future work

Due to the small number of controlled trials and due to the small number of patients studied, it is not possible to make firm judgments regarding the long-term efficacy of using *Yoga* to control asthma attacks. It is recommended that to more carefully construct randomized controlled trials using strict methodological quality be required to allow generalized conclusions.

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Conflicts of interest

There are no conflicts of interest.

References

1. O'Byrne P. GINA Executive Committee. Global Strategy for Asthma Management and Prevention. National Institutes of Health Publication No. 02-3659; 2004.
2. Williams K, Steinberg L, Petronis J. Therapeutic application of iyengar yoga for healing chronic low back pain. Int J Yoga Ther 2003;13:55-67.
3. Raub JA. Psychophysiologic effects of hatha yoga on musculoskeletal and cardiopulmonary function: A literature review. J Altern Complement Med 2002;8:797-812.
4. Woodyard C. Exploring the therapeutic effects of yoga and its ability to increase quality of life. Int J Yoga 2011;4:49-54.
5. Arora S, Bhattacharjee J. Modulation of immune responses in stress by yoga. Int. J Yoga 2008;1:45-55.
6. Juniper EF, Guyatt GH, Willan A, Griffith LE. Determining a minimal important change in a disease-specific quality of life questionnaire. J Clin Epidemiol 1994;47:81-7.
7. Laupacis A, Sackett DL, Roberts RS. An assessment of clinically useful measures of the consequences of treatment. N Engl J Med 1988;318:1728-33.
8. Manocha R, Marks GB, Kenchington P, Peters D, Salome CM. Sahaja yoga in the management of moderate to severe asthma: A randomised controlled trial. Thorax 2002;57:110-5.
9. Sabina AB, Williams AL, Wall HK, Bansal S, Chupp G, Katz DL, *et al.* Yoga intervention for adults with mild-to-moderate asthma: A pilot study. Ann Allergy Asthma Immunol 2005;94:543-8.
10. Markham AW, Wilkinson JM. Complementary and alternative medicines (CAM) in the management of asthma: An examination of the evidence. J Asthma 2004;41:131-9.
11. Vamos M, Kolbe J. Psychological factors in severe chronic asthma. Aust. N Z J Psychiatry 1999;33:538-44.
12. Vedanthan PK, Kesavalu LN, Murthy KC, Duvall K, Hall MJ, Baker S, *et al.* Clinical study of yoga techniques in university students with asthma: A controlled study. Allergy Asthma Proc 1998;19:3-9.
13. Vempati R, Bijlani RL, Deepak KK. The efficacy of a comprehensive lifestyle modification programme based on yoga in the management of bronchial asthma: A randomized controlled trial. BMC Pulm Med 2009;9:37.