ROLE OF SHORT TERM YOGA ON PULMONARY FUNCTIONS OF YOUNG AND MIDDLE AGED HEALTHY INDIVIDUALS

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Abstract

Background and Objective: Yoga attracts people primarily as an easy way to good health. Yogic techniques are known to improve one's overall performance and working capacity. So, our study aimed to evaluate the pulmonary functions in healthy individuals aged 20 to 65 years before and after short duration yoga training and to evaluate the differential effects between young and middle aged individuals.

Methods and Material: A comparative prospective study involving 52 healthy individuals aged 20 to 65 years. The study group was divided into two according to age Group I (age=20-40 yrs, young adults) and Group II (age=40-65 yrs, middle aged). Pulmonary function parameters like Breath Holding Time, 40 mmHg Endurance Test, Vital Capacity, FEV1% and PEFR were recorded before and after two weeks yoga training. The mean values of parameters were compared within and between groups before and after yoga training.

Results: We found statistically significant higher values of 40 mmHg Endurance Test and PEFR in Group I compared to Group II before yoga training. Also found statistically significant improvements of the pulmonary function parameters in Group I as well as Group II after short term yoga training but the effects were more prominent in Group I. There is statistically significant higher values of PEFR in Group I compared to Group II after yoga training.

Conclusion: This study showed beneficial effects of short term yoga on pulmonary function parameters in healthy subjects aged 20 to 65 years, particularly in young adults.

Keywords: Yoga, BHT, 40 mm Hg Endurance Test, VC, FEV1, PEFR

1. Introduction:

In today's busy and stressful life people are opting for yoga as an easy way towards good health. But, yoga is neither easy nor it is meant to cure the disease. Health is not the goal of yoga but it's by product[1].

Regular practice of Yoga is known to improve overall performance and working capacity[2]. Current evidence suggests improvement in cardiovascular and pulmonary functions following yoga practice[3].

Yogic asanas and pranayama have been shown to reduce the resting respiratory rate. Furthermore, they increase vital capacity, Timed Vital Capacity, Maximal Voluntary Ventilation, Breath Holding Time, Maximal Inspiratory Pressure and Maximal Expiratory Pressure[4].

Physical and mental relaxation can be achieved by practice of yogic asanas. Good numbers of studies have shown the superiority of asanas over ordinary physical exercise in terms of their physical benefits and therapeutic effects[5].

However most of these studies have been done on middle aged subjects and have evaluated the benefits of long term yoga practice. There are few reports regarding beneficial effects of short duration yoga[6].

In view of this, the present study was designed to evaluate the effects of short duration of yoga training on pulmonary functions in healthy individuals aged 20 to 65 years. Also to evaluate the differential effects of short term yoga practice in young and middle aged individuals.

2. Material &Methods:

A yoga camp of 2 week duration was organized by department of yoga sciences BLDEU's Shri B.M.Patil Medical College, Bijapur. All the subjects were trained to practice yogasana, pranayama, dhyana and spiritual lectures for one hour duration between 6am to 7am and and between 5.30pm to 6.30pm. Participants were staff and students of the same college in the age

range 20 to 65 years. We evaluated 52 participants.

All the participants were divided into two groups according to their age – Group I-young adults (age=20-40yrs, n=29,) and Group II-middle aged (age=50-65 yrs, n=23).

Institutional Ethical clearance obtained.

After explaining the design and purpose of the study, medical history was obtained. Informed consent to take part in the study was sought from each subject.

Exclusion criteria: Subjects with cardiorespiratory diseases, hypertension, diabetes mellitus,h /o having suffered from tuberculosis, asthma, undergone major surgery in the recent past, athletes and those who are practicing yoga since long term.

All the parameters were recorded in the departmental laboratory between 8 to 10 am. Recordings were made before yoga training and after completion of yoga training. Anthropometric parameters like height, weight of each subject was recorded. BSA was calculated by using Dubois nomogram. BMI was calculated for each subject from his/her respective height (meter) and weight in kg. Pulmonary function parameters like Vital Capacity, FEV1% recorded using recording spirometer (Inco, Ambala, India), Peak Expiratory Flow Rate recorded using Mini Wright's Peak Flow meter (Inco, Ambala, India), 40mmHg Endurance Test recorded using mercury sphygmomanometer (Diamond) and Breath Holding Time were recorded in each subject.

2.1 Stastical Methods: All values are presented as Mean ± Standard Deviation. Comparison of mean values of parameters before and after yoga within and between groups was done by using student's 't' test[7]. p Value <0.05 is considered as significant.

3. Results:

Table 1: Characteristics of subjects of Group I and Group II.

Parameters	Group I (n=29)	Group II (n=23)
Age(yrs)	30.27±7.23	57.21±6.48
Weight(kg)	73.82±7.35	71.91±6.11
Height(cm)	163.79±6.81	165.54±4.39
BSA(m^2)	1.86±0.58	1.83±0.87
BMI(kg/m^2)	28.30±3.21	23.69±3.42

Values expressed as (mean ± SD). BMI: body mass index.
BSA: Body Surface Area

Mean age in years of subjects in Group I and Group II is 30.27±7.23 and 57.21±6.48 respectively (Table 1).

3.1 Comparison of parameters between Group I and Group II before yoga training:

Table 2: Comparison of pulmonary function parameters between group I and group II before yoga training.

Parameters	Group I	Group II	t value	p value
	Before	Before		
BHT (secs)	32.31±11.03	29.54±14.06	0.69	>0.05
40 mm Hg Endurance test (secs)	23.48±10.06	23.37±9.92	0.01	0.01**
VC(ml)	2156±314	1826±457	0.6	>0.05
FEV 1(%)	86.57±9.20	83.03±11.95	0.4	>0.05
PEFR(L/Min)	462.16±69.17	413.46±0.59	0.01	0.01**

Values expressed are (mean ± SD), *p<0.05 significant,
**p<0.01 Highly significant, ***p<0.001 very highly significant
BHT: Breath Holding Time, VC: Vital Capacity, FEV1: Forced Expiratory Volume in
1st second, PEFR: Peak Expiratory Flow Rate.

PEFR and 40 mmHg Endurance test are significantly higher (p=0.01) in Group I compared to Group II. Statistically insignificant higher BHT, VC and FEV1% in Group I compared to Group II (Table 2).

3.2 Comparison of parameters before and after yoga training:

Table 3: Comparison of various pulmonary function parameters within the group I before and after yoga training.

Parameters	Group I		t value	p value
	Before	After		
BHT(secs)	32.31±11.03	41.51±11.86	1.081E-06	<0.001***
40 mm Hg Endurance test (secs)	23.48±10.06	29.79±10.36	4.540E-11	<0.001***
VC(ml)	2156±314	2466±306	0.0038	<0.01**
FEV 1(%)	86.57±9.20	95.32±4.22	0.0001	<0.001***
PEFR(L/Min)	462.16±69.17	557±57.9	1.016E-06	<0.001***

Values expressed are (mean ± SD), *p<0.05 significant, **p<0.01 Highly significant,
***p<0.001 very highly significant BHT: Breath Holding Time, VC: Vital Capacity,
FEV1: Forced Expiratory Volume in 1st second, PEFR: Peak Expiratory Flow Rate.

Group I: Statistically significant (p<0.001) increase in BHT, 40 mmHg Endurance test, VC, FEV1% and PEFR after yoga training (Table 3).

Table 4: Comparison of various pulmonary function parameters within group II before and after yoga training.(mean±SD)

Parameters	Group II		t value	p value
	Before	After		
BHT(secs)	29.54±14.06	37.41±13.13	4.28E-07	<0.001***
40 mm Hg Endurance test (secs)	23.37±9.92	28.92±12.49	1.801E-07	<0.001***
VC(ml)	1826±457	1906±309	2.67E-11	<0.001***
FEV 1(%)	83.03±11.95	87.63±8.71	6.018E-10	<0.001***
PEFR (L/Min)	413.46±0.59	457.31±65.05	2.64E-05	<0.001***

Values expressed are (mean ± SD), *p<0.05 significant, **p<0.01 Highly significant, ***p<0.001 very highly significant BHT: Breath Holding Time, VC: Vital Capacity, FEV1: Forced Expiratory Volume in 1st second, PEFR: Peak Expiratory Flow Rate.

Group II: Statistically significant (p<0.001) improvement in BHT, 40 mmHg Endurance test , VC, FEV1% and PEFR after yoga training(Table 4).

Table 5: Comparison of various pulmonary function parameters within the group I and group II after yoga training.

Parameters	Group I	Group II	t value	p value
	After	After		
BHT(secs)	41.51±11.86	37.41±13.13	0.24	>0.05
40 mm Hg Endurance test (secs)	29.79±10.36	28.92±12.49	0.78	>0.05
VC(ml)	2466±306	1906±309	0.64	>0.05
FEV 1(%)	95.32±4.22	87.63±8.71	0.23	>0.05
PEFR (L/Min)	557±57.9	457.31±65.05	0.01	0.01**

Values expressed are (mean ± SD), *p<0.05 significant, **p<0.01 Highly significant, ***p<0.001 very highly significant BHT: Breath Holding Time, VC: Vital Capacity, FEV1: Forced Expiratory Volume in 1st second, PEFR: Peak Expiratory Flow Rate.

3.3 Comparison of parameters between Group I and Group II after yoga training: PEFR is significantly higher (p=0.01) in Group I compared to Group II. Statistically insignificant higher BHT, 40 mmHg Endurance test, VC and FEV1 Group I compared to Group II (Table 5).

4. Discussion:

The results of our study demonstrate the beneficial effects of short term yoga practice on pulmonary function parameters.

4.1 Effect of short term yoga on BHT: In our study there was a significant increase in the BHT by an average value of 10 seconds in Group I and 8 seconds in Group II after short term yoga practice. Improvement in BHT may be due to practice of yoga which makes stretch receptors to withstand more stretching. Also the sensitivity of the respiratory center to carbon dioxide is reduced. Hence respiratory center can withstand higher carbon dioxide concentrations in the alveoli and the blood. With training subject can exercise voluntary control on the respiratory muscles overriding the excitatory stimuli to respiratory centers. In addition there is gradual acclimatization of receptors to the increased concentrations of carbon dioxide[8]. Similar findings were observed in other studies[9, 10].

4.2 Effect of short term yoga on 40 mmHg endurance: There is significant increase in the 40 mmHg endurance indicating increase in respiratory muscle endurance[11]. Increase in respiratory muscle strength and delayed onset of fatigue following yoga training increases respiratory muscle endurance[10, 12 13].

4.3 Effect of short term yoga on VC, FEV1% and PEFR: Vital capacity (VC), FEV1% and PEFR showed significant improvement following yoga training. Yoga training increases strength of respiratory muscles contributing to improvement in pulmonary functions[12]. Our results are similar to findings of other studies by Joshi et al[14], Pansare et al[15] who observed improvements in pulmonary function following a yoga practice of longer duration. These results indicate that the duration of time practicing yoga may not be a critical factor in improving lung function[16].

4.4 Effect of short term yoga in young and middle aged individuals: In our study the effect is more prominent in young than in middle aged. In our study BHT increased by 10 seconds and 8 seconds, 40 mmHg Endurance Test increased by 6 seconds and 5 seconds, VC increased by 310 ml and 80 ml, FEV1 % increased by 9% and 4%, PEFR increased by 95L/min and 44L/min in Group I and Group II respectively. These findings suggests improvement in pulmonary functions following yoga training occur in both the groups but the magnitude of improvement is more in young (Group I) compared to middle aged (Group II).

This variation in the effect may be due to age related problems of participants to perform asanas properly, or with aging the strength of the respiratory muscles reduces and the normal expansion of the chest does not occur[17].
Results of our study suggests that a practice of yoga for only a short duration of time showed an overall improvement in respiratory function similar to those found in more long term studies.

Conclusion: This study showed beneficial effects of short term yoga on BHT, 40 mmHg Endurance test, VC, FEV1 and PEFR among healthy subjects between the age group of 20 to 65 years. The improvement in pulmonary functions is observed in both young and middle aged individuals but more prominent in young individuals compared to middle aged.

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