Effect Of Yoga Practices On Respiratory Parameters In Healthy Young Adults

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Abstracts: Background & Objectives: Besides spiritual achievements, the practice of yoga is accompanied by a number of beneficial physiological effects in the body. The regular practice of yoga integrates the mind and the body.It produces many systemic psycho-physical effects in the body, besides its specific effects on the respiratory functions.The aim of the present study was to assess the beneficial effects of yoga in the improvements in the pulmonary functions of young healthy adults. **Methods:** The study group consisted of 30 young adults (19 males and 11 females) who were students of first year M.B.B.S.,medical college Baroda.They were motivated to participate in yoga workshop for one hour daily for four weeks. The first phase of the recording of the pulmonary parameters (M.V.V,FVC,FEV1,PEFR) was done at the beginning of their course. The second phase of the recording was done after 4 weeks of the regular yoga practice. The data were analyzed using student's Paired T – test. **Results:** Participants had a mean±SD age of 17.81 ± 0.48 years, height of 164.21±5.09 cm and weight of 54.34±5.63kg. The MVV(L/MIN) - before yoga practice showed a value of 97.4±24.4 and after , it showed a value of 119±28. The FVC(ml) - before yoga practice showed a value of 2575 ±631and after , it showed a value of 2768 ±618. The FEV1(ml)- before yoga practice showed a value of 2270± 636 and after , it showed a value of 2476 ±570. The PEFR(L/MIN) - before yoga practice showed a value of 479±103 and after , it showed a value of 585±120. For all the parameters, a P value of <0.01 was considered as statistically significant. **Conclusion:** There was a statistically significant increase in all the above lung parameters in the regular yoga practitioners.This study proposes that regular practice of yoga can improve health related aspects of physical fitness and general wellbeing. [Parikh H NJIRM 2014; 5(3) :37-41]

Key Words: yoga,pulmonary function parameters(MVV,FVC,FEV1,PEFR).

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Introduction: Exercises in different forms, if performed regularly, have a beneficial effect on the various systems of the body. The modality of exercise that is most beneficial and economic for masses has now become the topic of research[1].Ancient yogic exercises which have been claimed to benefit human body on multiple fronts are also getting popularity all over the world[2].Yoga refers to a system of philosophy established in India thousands of years ago. It helps to develop spirit of harmony through coordinating mind and body.Yoga involves physical, mental, social, spiritual aspect of human existence[16].Yoga has been reported to improve the pulmonary functions to a great extent as it involves physical activity as well as breathing exercise[3,4]. The aim of the present study was, therefore, to assess the beneficial effects of yoga in the improvements in the lung functions.In this study, we tested the hypothesis that a 4-weeks respiratory yoga training program improves respiratory functions, in healthy young adult subjects.

Material And Methods: The present study was carried out in the department of physiology,medical college , Baroda. A group of 39 medical students of first year M.B.B.S. was selected.Since age, height, weight affect pulmonary function tests following criteria were used for selection of subject.

Inclusion Criteria:

- The subjects were chosen from the age group of 17 to 19 years.
- The height of all subjects ranged from 150-175 cms.
- The weight of all subjects ranged from 40-65 kg.

Exclusion Criteria:

- The students who showed seasonal attacks of common cold and cough.
- The students who were hospitalised in the last 5 years due to severe attacks of bronchial asthma.
- The students who were having history of any other major llness viz: hypertension, diabetes mellitus, heart disease etc.

- The students who had history of Smoking.
- Chest deformities like kyposis and scoliosis.

Systemic diseases and respiratory disorders were ruled out in the selected subjects by taking their detailed history and by their thorough clinical examination.

Depending on inclusion / exclusion criterias,the number of subjects finally taken were reduced to 30.Out of 30 students 19 were males and 11 were females.The subjects were explained the purpose and importance of the study.They were motivated to participate in the present work only.Prior concent was taken for participation in research and yoga workshop. Those who conseted were registered for yoga workshop. The pre- workshop data of respiratory parameters was taken prior to yoga workshop and follow up data collection for the same parameters was there after 1 month of yoga practices.

- Maximum voluntary ventilation [MVV]
- Forced vital capacity [FVC]
- Forced expiratopry volume in one second [FEV1]
- Peak expiratory flow rate [PEFR]

All the above tests were done at the same time of the day i.e. between 8 to 9 a.m. to avoid diurnal variation.The results of pulmonary function tests before & after yoga therapy were compared & statistically analyzed using student's Paired T–test .

Patients used to perform yogasana for one hour a day. The yogic curriculum included prayers followed by chanting 'om', pranayama,meditation & different asanas i.e. different physical postures.The asanas performed in the yoga therapy class were as follows.

- Sukhasana
- Padmasana
- Chakrasana
- Shavasana
- Matsyasana
- Makarasana
- Bhujangasana

Method: They were made well versed with the functioning of instruments(Godart,Holland's expirograph and mini wright's peak flow meter). Each parameter was demonstrated personally to every subject.They were allowed rehearse the technique before actual records were taken.3 to 4 trials of maximal inspiratory and expiratory efforts were made and only the highest reading was taken for data processing. As recommended by Snowbind's workshop, all the readings were taken with the subjects in the standing position[5].All the tests were carried out at the same time of the day, between 8.00 am to 9.00am, to avoid the possible variations, because rhythmic changes in the physiological functions were found to be associated with changes in the performance during this period [6]. The tests were done in a quiet room in order to alleviate the emotional and psychological stresses. During the tests, a maximum effort from the subjects was ensured by adequately motivating them to perform at their optimum level.

M.V.V**:** It was conducted using expirograph (godart, holland). The speed of moving drum was set at 60 mm/min.The subjects were instructed to perfom deep forceful inspiration followed by deep forceful expiration in succession as quick as possible for a period of 10 seconds.

FVC And FEV1: It was also done with the help of expirograph.The speed of moving drum was set at 1200 mm/min. the subject was asked to take maximal inspiration and immediately made to expire out forcefully as fast and as long as possible.This was the graph for FVC.From this graph FEV1 was calculated.

P.E.F.R: It was obtained by mini wright's peak flow meter.Subject was asked to take deep inspiration and blow forcefully through the mouthpiece attached to the peak flow meter.Three readings of PEFR were taken by reading directly from the calibrated scale of the instrument(lit/min).Mean of three readings was taken as PEFR.

Result: Yoga group started with 39 members but 9 of them failed to complete the course. Therefore yoga training course finished with 30 subjects. The subjects had no other physical activities three

months prior to our study.In yoga group statistical analysis using student's Paired T – test revealed that there was a significant increase in pulmonary capacities (MVV, FVC,FEV1,PEFR).

Table 1: Sex-Wise Distribution, Mean And Standard Deviation Of Age, Height And Weight

Parameters	Male (n=19)	Female (n=11)	Total (n=30)
Age (years)	17.89 ±0.46	17.64 ±0.50	17.81 ±0.48
Height (Cms.)	166.95 ±3.60	159.45 ±3.59	164.21 ±5.09
Weight (Kg.)	57.34 ±4.25	49.14 ±3.56	54.34 ±5.63

Table 2 : Showing Mean & Standard Deviation Of Observations Before & After 1 Month Of Yogatherapy

Parameters	Before		After 1 month	
	Mean	±SD	Mean	±SD
MVV(L/min)	97.4	24.4	119	28
FVC(ml.)	2575	631	2768	618
FEV1(ml)	2270	636	2476	570
PEFR(L/min)	479	103	585	120

Table 3 : Showing Results Of Paired'T' Test

Parameters	Before and After 1 month yoga therapy	
	't' value	'p' value
MVV(L/min)	6.68	<0.001*
FVC(ml.)	4.82	<0.001*
FEV1(ml.)	3.41	<0.01**
PEFR(L/min)	8.45	<0.001*

* -Highly significant
** -Significant

Discussion: Respiratory parameters MVV,FVC, FEV1,PEFR are valuable tool for evaluating the respiratory system. Respiratory parameters MVV,FVC, FEV1,PEFR have been studied in yoga practitioners. They have shown that the regular practice of these long-term yogic techniques have proved to be beneficial for the human body and that it also improved the breath holding time[7,8].

This study is designed to know the effect of short term yoga(4 weeks) techniques on the pulmonary function parameters. In our study, the MVV,FVC, FEV1, PEFR values were recorded in young healthy subjects before and after 4 weeks of yoga.The pulmonary function parameters(MVV, FVC, FEV1, PEFR) were found to be significantly increased.

In our study, a greater improvement of the pulmonary parameters was observed. This may be because our subjects were young, healthy adults (mean age group:17.81± 0.48 years) who had practised yoga for 4 weeks[9].

These results were consistent with those of other studies which were done by Yadav A et al.[9,] Upadhyay KD et al.[10]and Chanavirut et al.[11]. All these studies have explained that, during yoga training, regular inspiration and expiration for prolonged period leads the lungs to inflate and deflate maximally and that it causes strengthening and increased endurance of the respiratory muscles [17,18,19,20]. This maximum inflation and deflation is an important physiological stimulus for the release of surfactants and prostaglandins into the alveolar spaces, which thereby increase the lung compliance[21,22].The stretch receptors reflexly decrease the tracheobronchial smooth muscle tone activity, which leads to decreased air flow resistance and increased airway caliber, which causes the dynamic parameters of the lung function test to improve.

Vishav G. investigated the effects of yoga on physical fitness including agility, strength, power, cardiovascular endurance and speed. Results indicated that these variables improved significantly except for cardiovascular endurance[23].

Mandanmuhan showed that yoga training could improve FEV1 and PEFR in students significantly[12.]Telles et al mentioned that slow breathing in pranayama exercises improved the autonomic nervous system and increased the activation of parasympathetic system[13].

Joshi showed that practicing pranayama for 8 weeks improved pulmonary function tests such as FEV1, FVC,PE, MVV(maximum voluntary ventilation) and decreased RR[14].

Mandamahan et al reported that training of yoga for 6 weeks increased respiratory pressure significantly[12]. In another study they had reported that 12 weeks of yoga training put a significant increasing effect on breath holding time, maximum inspiratory pressure, breath holding time after inspiration and expiration and strengthening of hand grip[15].

Regular inspiration and expiration for prolonged period leads the lungs to inflate and deflate maximally and that it causes strengthening and increased endurance of the respiratory muscles[17,18,19,20]. This maximum inflation and deflation is an important physiological stimulus for the release of surfactants and prostaglandins into the alveolar spaces, which thereby increase the lung compliance [21,22]. The stretch receptors reflexly decrease the tracheobronchial smooth muscle tone activity, which leads to decreased air flow resistance and increased airway caliber, which causes the respiratory parameters MVV,FVC,FEV1,PEFR to improve.

Conclusion: This study findings show that four weeks of yoga training can significantly increase MVV,FVC, FEV1,PEFR.This study proposes that regular practice of yoga can improve health related aspects of physical fitness and general wellbeing.This resultant effect of yoga can be used as lung strengthening tool to treat many lung diseases like asthama, allergic bronchitis, post pneumonia recoveries, tuberculosis and many occupational diseases. Yoga is the key in bringing the sympathetic and the parasympathetic nervous system into harmony.

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