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Research Article

EFFECT OF 8 WEEKS OF PRANAV PRANAYAMA TRAINING ON PULMONARY FUNCTION TEST PARAMETERS IN YOUNG HEALTHY, VOLUNTEERS OF JIPMER POPULATION

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Abstract: **Background:** Yoga is an ancient Indian science it has been practiced as a healthy way of life. Yoga consists of five principles that include proper exercise, proper relaxation, proper breathing, proper diet, positive thinking and meditation. Pranayama is a method of breathing and chest expansion exercise has been reported to improve respiratory function in healthy individuals as well as in patients with respiratory diseases... The aim of the study is to find out the positive beneficial effects of pranav pranayama training on pulmonary function parameters in young healthy, volunteers of both the genders. **Materials and methods:** The present study was conducted on 12 healthy volunteers of both genders. Among them 6 were males subjects and 6 were females subjects. The mean age group of the subjects was 18.58±0.66 years. Pre and post pulmonary function parameters such as FEV_1, FVC, FEV_1/ FVC, FEF_{25-75}, MVV were taken using the spirometer at the end of 8 weeks pranayama training. **Results**: Our results showed a significant difference in pulmonary function parameters. Before paranayma training FVC was around 2.29+ 0.58, after it was 2.35+0.63, FEV1 was around 2.22+0.59 after it was 2.285+0.63, FEV1/FVC was around 97.11+3.83 after it was 97.45+3.36, FEF was around 3.35+1.01,after it was around 5.85+8.15, PEFR was around 266.83+72,after it was around 290.91+82.56, MVV was around 84.2+23.16 after it was around 85.90+ 23.59, from the above results we concluded that PEFR was not statically significant $P< 0.05$. Other parameters showed a significantly high value in pre and post data which is statistically significant $P> 0.05$.**Conclusion:** From our study we found that 8 weeks of pranav pranayama training in the young, healthy volunteers showed increase in the commonly measured pulmonary function parameters, but the increase was not statistically significant probably because of short duration of training. By increasing the duration of time the reliable goal can be achieved by obtained maximal values of pulmonary function parameters which reflect directly on lung health status.

Key**words:** Pranav Pranayama, pulmonary function, healthy lungs, dead space, ventilatory function.

Introduction

Yoga, an ancient Indian science has been practiced as a healthy way of life. Yoga emphasizes on controlled breathing (pranayama), body posture (asana), relaxation of mind (meditation) keeps a person energetic & healthy for maintaining health and fitness and for treating diseases. Pranayama is a method of yogic type of breathing and chest expansion exercise, has been reported in previous studies as it is known to improve respiratory function in healthy individuals as well as in respiratory diseases. Pranayama, the fourth step of ash tang yoga is an important component of yoga training. 'Prana' the vital life force that acts as a catalyst in all our activities and 'Ayama' is the expansion of Pranayama can be defined as the science of controlled, conscious expansion of Prana in our energy body sheath. As a deep breathing technique, Pranayama reduces ventilation and decreases work of breathing. It also refreshes air throughout the lungs, in contrast with shallow breathing that refreshes air only at the base of the lungs[(3)]. Spirometry is the most commonly used technique to screen the respiratory diseases. It includes the assessment of lung volumes and flow-volume curves [(1, 2)]. Among the previous Studies conducted at pranayama in several institutions in India have reported impressive success in improving the lung functions and has a positive effect and permanent relief from asthma. It has also been proved that asthma attacks can usually be prevented by Yoga methods without resorting to drugs. Physicians have found that the addition of improved concentration ability and yogic meditation together with the practice of simple postures and pranayama makes treatment more effective in patients who practice. Yoga has a better chance of gaining the ability to control their breathing problems. With the help of yogic breathing exercises, it is possible to control an attack of severe shortness of breath

without having to seek medical help. Various studies have confirmed the beneficial effects of pranayama for patients with respiratory problems [2, 3] .The ultimate goal of traditional yogis was "self realization" or "enlightenment", a concept, which perhaps is quite esoteric to you and me. The first step on this path is to reduce peripheral mental activity through bringing awareness into the body, and then later through relaxation and meditation to simply observe the breath. This helps to quiet the mind and take us to a place of peace. The reduction, and ultimately cessation of mental activity is the goal or aim of meditation. On experiencing this state we become aware of our unity with all things and our essential nature of peace [3].

Materials and methods

The present study was conducted on 12 young healthy, volunteers of both the genders. Mean age was 18.58±0.66 years. After obtaining clearance from the Institute Ethics Committee, subjects were motivated and recruited for the study. Subjects with the history of active sports training, previous experience of yoga, history of chronic respiratory illness, history of major surgery in the recent past, smoking, alcohol consumption were excluded from the study. The subjects were familiarized with the aims and objectives of the study as well as laboratory environment. After giving detailed information about the study, written consent was obtained from the volunteer subjects.

Analysis of Parameters:

Baseline parameters (pre values) were recorded at the beginning of the study. Height and weight were measured using height scale and weighing scale respectively. Using spirometer (Micro lab Version 1.32) pulmonary function parameters were recorded. Pulmonary Function Tests parameters analyzed are studied were Forced Vital Capacity (FVC), Forced Expiratory Volume in first second (FEV_1), Ratio between FEV_1 and FVC (FEV_1/ FVC), Peak Expiratory Flow Rate (PEFR), and Forced Expiratory Flow at 25-75 (FEF_{25-75}) and Maximum Voluntary Ventilation (MVV). The values of all tests were taken as % predicted as per age, sex and height of each subject according to standard equation .The subjects were instructed to do the procedure in the sitting posture, with the erect spine, without forward bending. The subject is asked to keep the mouth piece inside the mouth with the lips closed so as to make a seal, to avoid air leak while blowing; nose was closed with the nose clips. They performed slow expiratory vital capacity and forced vital capacity maneuvers. These procedures were repeated for two more times with of 3-5 minutes of interval in-between. The subjects are instructed to give their maximal effort. The above said PFT parameters such as FVC, FEV_1, FEV_1 / FVC, FEF_{25-75}, PEFR and MVV were noted. Three readings were taken and the best value out of them was recorded. The same procure was followed while recording the post values at the end of 8 weeks of pranayama training.

Pranayama training:

The subjects were given pranav pranayama training and practiced the same under the guidance of a trained, certified yoga instructor at Advanced Centre for Yoga Therapy Education and Research (ACYTER), JIPMER, Pondicherry. Practice sessions were conducted three days per week (Monday, Wednesday and Friday) during the evening time for 20-30 minutes for a total duration of eight weeks. On rest of the days subjects were motivated to practice at their home. Pranav pranayama is slow, deep and rhythmic breathing in co ordination with A, U; M sounds which were pronounced during expiration. They were asked to assume 'Sukhasana' (the comfortable posture). Deep inhalation for 6 counts in co ordination with turning the head to right side. This is followed by chanting 'ah' in coordination with the movement of head towards centre. Deep inhalation for 6 counts in co ordination with turning the head to left side. This is followed by chanting 'vu' in coordination with the movement of head towards centre. Deep inhalation for 6 counts in co ordination with turning the head and chin up. This is followed by chanting 'ma' in coordination with the movement of head towards centre.Pranav pranayama was given for 3 cycles. At the end subjects were made to lie down in Shavasana for 10 minutes.

Statistical analysis:

Graph pad software was used to analyze the data. The values obtained from pre and post training period were analyzed using Student's paired *t* - t e s t. Data were expressed as Mean ± SD.'P' value of less than 0.05 was considered as significant.

Results:

Our results showed a significant difference in pulmonary function parameters. Before paranayma training FVC was around 2.29+ 0.58, after it was 2.35+0.63, FEV1 was around 2.22+0.59 after it was 2.285+0.63, FEV1/FVC was around 97.11+3.83 after it was 97.45+3.36, FEF was around 3.35+1.01,after it was around 5.85+8.15, PEFR was around 266.83+72,after it was around 290.91+82.56, MVV was around 84.2+23.16 after it was around 85.90+ 23.59, from the above results we concluded that PEFR was not statically significant P< 0.05. Other parameters showed a significantly high value in pre and post data which is statistically significant P> 0.05. The above values are coded in table 1 as the pre and post data of our study which was conducted on 12 healthy volunteers of both the genders of age group around18.58±0.66 years. A positive result was analyzed among the pulmonary function parameters from our study.

Table 1: Effect of savitri pranayama training on pulmonary function parameters before and after 8 weeks of study period. Values are expressed as Mean±SD

PFT Parameters	BeforePranayama training (n=12)	After pranayama training (n=12)
FVC (L)	2.29± 0.58	2.35±0.63
FEV_1 (L)	2.22±0.59	2.285±0.63
FEV_1/FVC (%)	97.12±3.83	97.45±3.36
PEFR (L/m)	266.83±72	290.91±82.56 *
FEF_{25-75} (L/s)	3.35±1.01	5.85±1.15**
MVV (L)	84.2±23.16	85.90±23.59

LEGEND -1 the values obtained before and after the training period were compared using Student's paired t - t e

s t *P< 0.05, **P < 0.01. Forced Vital Capacity (FVC), Forced Expiratory Volume in first second (FEV_1), Ratio between FEV_1 and FVC (FEV_1/ FVC), Peak Expiratory Flow Rate (PEFR), Forced Expiratory Flow at 25-75 (FEF_{25-75}) and Maximum Voluntary Ventilation (MVV).

Discussion

Yoga consists of different type of practices, most common of which is pranayama. Different pranayama produce different physiological effects. Madan Mohan et al conducted a study on effect of slow and fast pranayama on cardio- respiratory changes they concluded that pranayama has a positive effect by improving the cardio respiratory performance by minimizing the sympathetic effect on circulatory pool [(1, 4)]. Another study conducted by Joshi et al in which they found that yogic Asanas and pranayama reduce the resting respiratory rate and increase vital capacity, timed vital capacity, maximum voluntary ventilation, breath holding time and maximal inspiratory and expiratory pressures [(2)] . They concluded pranayama sessions in young male volunteers. The results of the study showed that there was a decrease in both expiratory and inspiratory muscle strength, alveolar hypoventilation due to depression of hypoxic and hypercapnoeic ventilatory drives and decrease in maximal breathing and diffusing capacity[(5)] The decrease of oxygen uptake due to meditative practice influenced the reduction of the total caloric expenditures that, as a variable derived from VO2, also had a statistically significant reduction of 35% which proves that oxygen consumption increases with pranayama practice [(6, 7)] Results of our study indicate that there was trend towards increase in the ventilatory function parameters including FEV_1, FVC, FEV_1/FVC, FEF_{25-75} and MVV between time points, although none of the parameters were statistically significant. However PEFR parameter showed statistically significant improvement. Improvement in the study subjects may have occurred due to strength and endurance of respiratory muscles and improvement in cardio, respiratory parameters. Our findings are in congruence with the previous studies of Udupa et al… A in1975. In our study the changes did not reach statistical significance probably due to differences in the protocols, study design and lesser number of subjects in our study [(9, 10)]. Our study further substantiates the claim that yoga practice is beneficial on the pulmonary function in normal subjects. In future we are planning to extend this study further with more number of subjects and duration of yoga training on healthy subjects as well as patients [(11)].

CONCLUSION

12 healthy volunteers between age group of 18.58±0.66 years years participated in this study. They were given training of pranav pranayama. Pulmonary function test parameters were recorded as pre and post sessions. Our results showed significant increase in pulmonary function parameters after regular practice of pranav pranayama .The present study has shown that adding comprehensive yoga-based breathing exercises (pranayama) to the daily life to improve the lung function.

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