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Original Research Article

Study of Suryanamaskar, Nadishodhana Pranayama, Omkar Chanting and Meditation (Yoga) on Respiratory Parameters in Young Healthy Medical Students

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Abstract: Stress may be defined as psychophysiological process usually experienced as a negative emotional state. It is a common condition, a response to a physical threat or psychological distress that generates a host of chemical and hormonal reactions in the body. The health effects of stress involve mainly autonomic, cardiovascular, and immune systems. The aim of present study was to investigate whether regular practice of Yoga for three months can improve respiratory functions. The present study included 60 male medical students of first M.B.B.S. of 18 to 22 years of age. After recording, basal mean tidal volume, mean vital capacity (VC), mean forced expiratory volume in first second (FEV1) and mean rate of respiration/min, these subjects underwent Suryanamaskar. Nadishodhana, Omkar Chanting and Meditation for the duration of 12 weeks. After the yogic training period the mean tidal volume, vital capacity (VC), forced expiratory volume in first second (FEV1), and rate of respiration / min was again measured and analyzed statistically by using student 't' test and was found to be significantly improved Regular practice of yoga for 3 months significantly improved the respiratory functions as tidal volume, vital capacity (VC), forced expiratory volume in first second (FEV1), and rate of respiration/ min. We conclude that regular practice of yoga for three months improves the respiratory parameters, possibly by inducing parasympathetic predominance and cortico-hypothalamo-medullary inhibition.
Keywords: Yoga; Respiratory parameters; Surya-namaskar

INTRODUCTION

The present age of speed and competition has increased the stresses and strains. It is resulting in life style related health problems such as Obesity, Diabetes Mellitus, Hypertension and Coronary Artery Disease [1]. Stress, anxiety and depression are known to be significant factors in the onset and progression of a wide spectrum of illness ranging from cardiovascular diseases, asthma, cancer, HIV-infection & affects multiple systems of body [2]. The word yoga means 'union': union of mind, body and spirit - the union between us and the intelligent cosmic spirit of creation- 'the oneness of all things' [3]. So pranayama—literally, "control of prana"—isn't just breathing exercises. Through pranayama, you use the breath to affect the constellation of energy that is your bodymind [4]. Yoga is a psycho-somatic-spiritual discipline for achieving union & harmony between our mind, body and soul and the ultimate union of our individual consciousness with the Universal consciousness [5]. Yoga, an ancient Indian science, aims to bring about functional harmony between body and mind through three main practices: asanas, pranayama and meditation. Pranayama means control of 'prana'. "Prana" in Indian philosophy, refers to all forms of energy in the universe. Life force in an individual is symbolized by breathing. Breath is a dynamic bridge between the body and mind [6]. The five principles of yoga are relaxation, exercise (asanas), pranayama (breathing control), nourishing diet, and positive thinking and meditation, pranayama are yogic breathing techniques that increase the capacity of lungs. Pranayama which is control of inspiration and expiration [7] Pranayama improves overall performance of the body. The regular practice of pranayama

increases chest wall expansion and almost all lung functions. The beneficial effect of different pranayama is well reported and has sound scientific basis [7, 8] Pranayama makes efficient use of abdominal and diaphragmatic muscles and improves the respiratory apparatus.[9] Yoga strengthens the respiratory musculature due to which chest and lungs inflate and deflate to fullest possible extent and muscles are made to work to maximal extent [7, 10].

The basic translation of *suryanamaskar (sun salutation)*is a very ancient Indian tradition, existence since the Vedic age. The physical basis of the *suryanamaskar* practice links together 12 asanas, *associated with 12 surya mantras and pranayama. That's why "best yogic exercise."* . These asanas alternately stretch the spine backward and forward, involves alternate inhalation and exhalation [11, 12]. Alternating backward and forward bending postures flex and stretch the spinal column through their maximum range giving a profound stretch to the whole body. Surya Namaskar has a deep effect in detoxifying the organs through copious oxygenation and has a deeper relaxing effect [13-15]. It is claimed that suryanamaskar practice gives benefits of both asana and pranayama and improves general health and fitness [16].

Omkar Pranayama is best pranayama, form by union of 3 words A, U, M. The origin of A, U, M sound for pronunciation of Om. A- Originate from navel, U- from throat and M- from nose. The abdomen connects both throat and nose. Navel connects digestion and excretion. Pronunciation of Om has effect on head, cerebrum and cerebellum. Regular practices of chanting of Om highly increases breathing capacity, capacity of digestion, circulatory capacity, regulate excretory function and nervous system. OM" meditation would also cause changes in the autonomic and metabolic functions of the meditators. Produce newer vitality, freshness and happiness [17]. Mental chanting of "OM" leads to a single thought state, and a subjective feeling of deep relaxation. Hence the present study was carried out to find out whether OM" meditation would also cause changes in the autonomic and metabolic functions of the meditators [18]. Short-term yoga practice (*suryanamaskar* and *pranayama*) was beneficial and prevented development of primary respiratory problems by increasing the efficacy of respiratory muscles [19, 7]. studied the significant increase in forced vital capacity (FVC) and peak expiratory flow rate (PEFR) following 6 weeks of *pranayama* practice. Bijlani [20] also reported similar observations. In the recent years a lot of research work has been done to improve the beneficial effect of yogic training. Yogasanas help in prevention, control and rehabilitation of many respiratory diseases. The present studies were undertaken with the objective to ascertain whether a short course of yogic practices has any influence on ventilatory functions in adult males. It is now almost a proved fact based on various yogic investigations that a prolonged continuous yogic practices relieve chronic respiratory diseases like bronchial asthma, chronic bronchitis and bronchiectasis and ventilatory functions are much improved in them. This conclusive information of improvement of ventilatory functions by short yogic practices will be applied on respiratory disease patients in the form of yogic therapy and these studies will now be carried out on patients [9].

MATERIAL & METHODS

Study group comprised 60 male healthy subjects of 18-22 years. The study protocol was explained to the subjects and written consent obtained. Approval by ethical committee of S.S. Medical College, Rewa, M. P., was obtained. All the volunteers were clinically examined to rule out any systemic diseases. All subjects were non-alcoholic and non-smokers. They were not taking any drugs and they had similar dietary habits as well as physical and mental activities at work and home. They were not practicing any known stress relieving or relaxation technique previously.

After recording, basal mean tidal volume, mean vital capacity (VC), mean forced expiratory volume in 1stsecond (FEV1), meanrate of respiration/min. These subjects underwent *Suryanamaskar*. Nadishodhana pranayama, Omkar Chanting and Meditation for the duration of 12 weeks.

- All the 60 volunteers of study group were trained under the guidance of a certified "yoga" teacher for 15 days in the Deptt. Of Physiology. They carriedout "*Suryanamaskar*, Nadishodhana pranayama, Omkar Chanting and Meditation" 60 minutes, twice a day for three months, under supervision, in a prescribed manner. The schedule consisted of-
- *Suryanamaskar* - -10 minutes
- Nadishodhana- -10 minutes
- Chanting of Om - -10 minutes
- Meditation- -30minutes

TheSuryanamaskar practiced were. Surya Namaskar (SN) or sun salutation, a traditional Indian yogic practice, renders the benefits of stretching, static, and dynamic exercise. Each round of SN practice involves practicing 12 postures in succession with forward and backward bending along with deep exhalation and inhalation and 12 mantras of Surya respectively to the maximum possible extent [21, 22].

The Pranayama performed was: Nadishodhana. The volunteers practiced these exercises early in themorning and in evening, in a quiet, well ventilated room or in open airspace sitting in a comfortable posture. Close the right nostril with the

right thumb. Now inhale slowly through the left nostril and fill your lungs. After inhalation, close the left nostril with ring finger of right hand. Open the right nostril, exhale slowly. After complete exhalation, again inhale through right nostril and close it with right thumb. Open the left nostril, breathe out slowly. This is one round ofNadishodhana Pranayama. Students were given Nadishodhana training for 10 min. daily for three months [23].

Chanting of Om (Pranava Pranayama): Chanting of "OM" practiced, in sitting /comfortable position with closed eyes,The Pranava is the full cosmic Om (or AUM), represented as the three distinct vibratory sounds of 'A' (ah), 'U' (oh) and 'M' (mm). The 'Ahh' sound originating from the solar plexus is related to lower lung breathing [23]. The 'Ohh' sound originating from the chest region corresponds to mid-chest breathing. The 'Mmm' sound, as it moves upward and transcends its auditory character is associated with upper lung breathing. The Om word was repeated several time with prolong breath holding and continued for 10 minutes [17].

The Meditation performed was the same, as was told by Lord Krishna to Arjun in Kuruchhetra [24]

After the yogic training period of three month, the mean tidal volume, vital capacity (VC), forced expiratory volume in 1 second (FEV1), and rate of respiration / min was again measured by using manual Spirometer and was found to be significantly improved.

Statistics

The data was analyzed statistically by using statistical software Graph Pad in Stat vs. 3.10 and MS Excell (2003). Statistical analysis of the mean tidal volume, vital capacity (VC), forced expiratory volume in 1st second (FEV1) and rate of respiration were done using student 't' test and $p < 0.01$ was considered as significant.

RESULTS

Our results showed that "Yoga" causes significant improvement in Respiratory parameters. A total of 60 male volunteers were included in the study. These volunteers practiced yoga regularly for three months. The statistical analysis was carried out by using student 't' test. It was observed that the mean tidal volume, vital capacity (VC), forced expiratory volume in 1stsecond (FEV1) and rate of respiration were statistically more significantly improved (Table 1, figure 1, 2).

Table 1: Showing changes in Tidal Volume mL, Vital capacity mL, Force expiratory volume / FEV_1 % and *Rate of Respiration/min* before and after six months of yoga in normal healthy subjects

S. No.	Parameters	Before yoga	After 3 months of yoga	P Value
		Mean Value S. D.	Mean Value S. D.	
1	Tidal Volume mL	481±55.22	548.3±53.1	p<0.000
2	Vital capacity mL	4107±.535	5417±264.5	p<0.000
3	Force expiratory volume / $FEV_{1\ \%}$	74.12±3.242%	86.32±1.933%	p<0.000
4	*Rate of Respiration/ min*	16.76±1.2	13.76±1.22	p<0.000

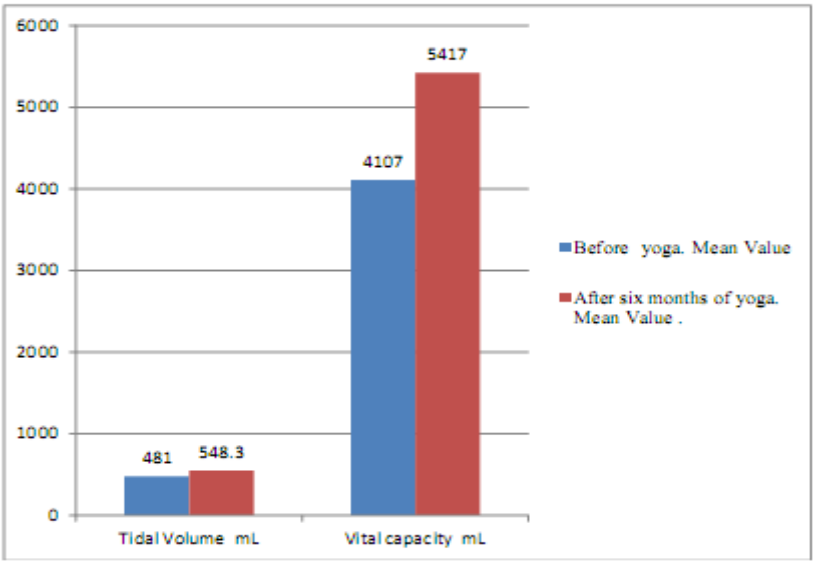

Fig-1: Showing the effect before and after yoga on Tidal volume mL/ min and Vital capacity mL

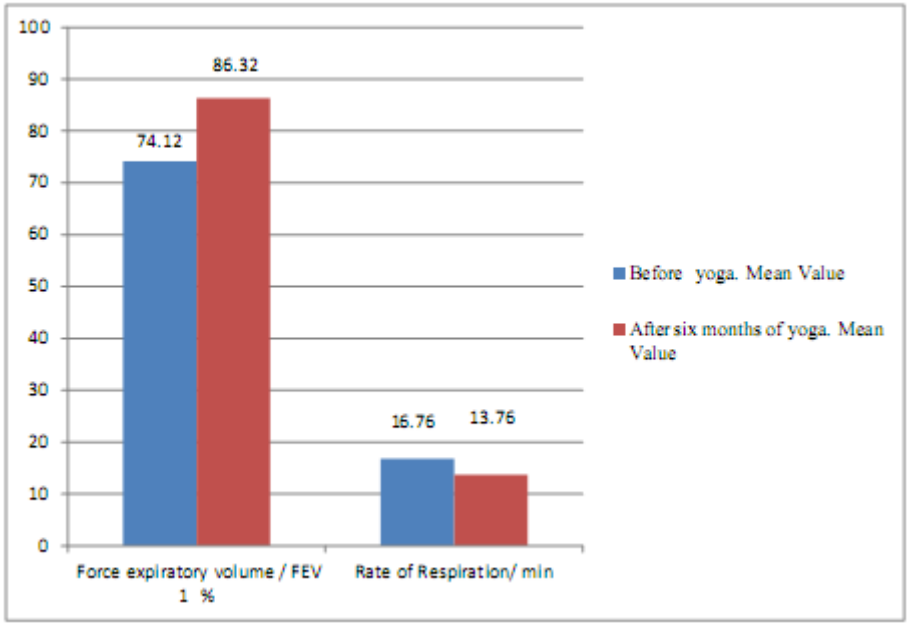

Fig-2: Showing the effectbefore and after yoga on Force expiratory volume / FEV1 % and Rate of Respiration/ min

Mean respiratory parameters: Before yoga, the mean basal tidal volume was 481±55.22 mL, mean basal vital capacity4107±.535 mL, and mean basal timed vital capacity 74.12±3.242% and mean basal rate of respiration 16.76 + 1.2 / min (Table 1).

The effect of 03 months of yoga in study group: After yoga, the mean basal tidal volume was 548.3±53.1 mL ($p<0.000$), mean basal vital capacity was 5417±264.5 mL($p<0.000$), mean basal timed vital capacity was 86.32±1.933%($p<0.000$) and mean basal rate of respiration 13.76±1.22/ min. ($p<0.000$) (Table 1).

DISCUSSION

The present studies were undertaken with the objective to ascertain whether a short course of yogic practices, viz Suryanamaskar, Nadishodhana Pranayama, Omkar Chanting and Meditation has any influence on ventilatory functions in adult males. We found out that regular practice of this type of yoga for 3 months significantly increased the respiratory functions such as tidal volume, vital capacity (VC), forced expiratory volume in first second (FEV1),whereas the rate of respiration was reduced. Surya Namsakar: Surya Namaskar is a series of 12 physical postures. These alternating backward and forward bending postures flex and stretch the spinal column giving a profound stretch to the whole body. It has a deep effect in detoxifying the organs through copious oxygenation and has a deeper relaxing effect [21]. Sasi *et al.* [25, 27] reported an increase of systolic blood pressure, peak expiratory flow rate, forced vital capacity, and reduction of respiratory rate, heart rate (HR), and diastolic blood pressure in 115 school children aged 10-14 years after practice of 30-40 min of daily SN for 45 days. Bhutkar and colleagues [15], have reported an increase in MVV and FEV_1 following 6 months of Surya Namaskar (SN) training and practice. Regular yogic practices strengthen the respiratory muscles; increase the excursions of diaphragm and lungs as well as thoracic compliance [9, 26] Baiju Abraham [27] in his study found that the vital capacity significantly improved ($P<0.01$) in experimental group. Result of our study is also supported by Bal, BS. [28] Nayar *et al.*, [26], LN Joshi *et al* [7] who suggested that Yogic asanas and pranayama have been shown to reduce the physiological parameters such as resting respiratory rate and increase vital capacity, timed vital capacity, maximum voluntary ventilation, breath holding time and maximal inspiratory and expiratory pressures.

The results of the present study demonstrated the beneficial effect of Nadishodhana pranayama on pulmonary function. It appears that the Pranayama helps in bringing the sympathetic and parasympathetic nervous system into harmony. This modulation of autonomic nervous system activity probably might have been brought about through the conditioning effects of yoga on autonomic function, mediated through limbic system and higher areas of the central nervous system. Significant improvement in FEV1 in our study indicates that it may be caused by strengthening of respiratory musculature incidental to regular practice of Pranayamic breathing. Similar ventilatory training even in elderly subjects (ages 60–75) has been shown to improve lung volumes and capacities [29] Pranayama, which is an integral part of yogic practices, is reported to improve breathing rate and ventilatory function of the lung [9, 7]. Significant improvement in FEV1, in our

study indicates that it may be caused by strengthening of respiratory musculature incidental to regular practice of pranayamic breathing. Through breathing we can influence the nervous system. *Omkar Chanting:* Omkar chanting consists of loud utterance of "OM" or "AUM". By chanting "aaaaaaa", one can feel the sensation and hence resonance of nervous system in the stomach and chest region. Chanting "ooooo" creates sensations in throat & chest region and resonates with them. Similarly, chanting/humming "mmmm" resonates with the nasal cavity as well as skull/brain region. AUM mantra which when chanted sequentially activates the stomach, spinal cord, throat, nasal and brain regions. The energy moves from the abdomen all the way up to the brain, thereby channelizing energy and activating the spinal cord & brain. Science behind chanting of OM mantra –It is cosmic sound which initiate the creation of Universe. The scientific and practical explanation (based on the physics of sound, vibrations & resonance) with some long term benefits [30].

CONCLUSIONS

Regular yogic practices strengthen the respiratory muscles; increase the excursions of diaphragm and lungs as well as thoracic compliance. Also yoga practices decrease airway resistance. All these factors contribute to improvement in the various lung function tests after regular practice of Surya Namaskar. After 3 months of yoga training, the readings of VC, TV, and FEV-1in 1st second show significant increase and rate of Respiration significantly decrease. From the present study we may conclude that yoga practice can be advocated to improve pulmonary functions in healthy individuals and hence to prevent respiratory diseases in future. These benificial effects of pranayama can be used as an adjuvant therapy for many respiratory diseases. The daily practice could also be parts of physical fitness and life style modification programs in maintaining better physical and mental health. Hence, it can be said that pranayama improves respiratory breathing capacity by increasing chest wall expansion and forced expiratory lung volumes.

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