

Original Research Article

Role of yoga in improving pulmonary efficiency in post-menopausal women

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ABSTRACT

Background: Menopause is a natural transition in a women's life. Menopausal transition has been linked to impairment of respiratory function. Female hormones play an important role in overall lung health. Yoga is an ancient Indian science as well as the way of life, which includes practice of yogasana in specific posture and pranayama which includes the regulated breathing techniques. The aim of the study was to evaluate the cumulative effect of practicing yoga and pranayamas on certain respiratory parameters and physical characteristics in post-menopausal women.

Methods: A total of forty post-menopausal women (46-60 years) were divided into two groups. Group I was control group (women not doing yoga) and group II was regularly doing yoga for one year. Based on the duration of yoga-pranayama and meditation, the respiratory parameters such as VC, FVC, FEV₁, PEFR, and FEF₅₀ was measured with the help of vitalograph (pneumotrac; 11). Data collected were compiled, categorized and statistically analyzed, t-test was used for comparing the effect of yoga between the two groups and $p \leq 0.05$ was considered as statistically significant.

Results: One-year yoga showed a significant decrement in Body weight ($p < 0.001$) and Body Mass Index ($p < 0.01$). Group II showed significant improvement ($p < 0.001$) in all the respiratory parameters such as VC, FVC, FEV₁, PEFR, and FEF₅₀ when compared to respective control group. Respiratory rate was decreased significantly ($p < 0.0001$) and Breath hold time was increased significantly ($p < 0.0001$) when compared to control group.

Conclusions: The present study demonstrated that the one-year of yogic practice is suitable for improving pulmonary efficiency and physical characteristics in post-menopausal women.

Keywords: Menopause, Yoga, Pranayama, Pulmonary function test, Physical characteristics

INTRODUCTION

Menopause is the phase of cessation of reproductive ability and natural transition in a women's life. In India it is considered that the median age of natural menopause is at 45 years. Menopausal transition has been linked to impairment of Respiratory function.¹ Increased deposition of body fat and central obesity lead to impairment of lung function.^{2,3} Reduced lung function and increased metabolic risk factors lead to cardio-vascular diseases. Menopausal women use complementary therapies to cope with their symptoms. Menopause is associated with some common symptoms such as hot flashes, night sweat, fatigue, pain, decreased libido, and mood changes.⁴⁻⁶ These

symptoms often persist for several years after menopause.⁷ Yoga is most used for relief of menopausal symptoms.^{8,9} Regular yoga practice indirectly improves the quality of life.^{10,11}

Literature survey shows that the advancing age, increasing the work of breathing and also observed drastic variations in the respiratory parameters. Female hormones play an important role in overall lung health. Yoga is an ancient Indian science as well as the way of life, which includes practice of yogasana in specific posture and Pranayama which includes the regulated breathing techniques. Breathing maintains the dynamic bridge between body and mind. Pranayama is the important yogic practices which

can produce different physiological responses in healthy individuals. The regular practice of yoga has been shown to increase the strength of muscles and flexibility of the body. Yogic exercises can be done in the limited space and in any weather conditions.^{8,9}

In this study overweight post-menopausal women were participated. Overweight mainly due to excess energy storage and physical inactivity of the participants. Any type of physical activity appears difficult among overweight and obese persons. Simple yoga postures and pranayamas are easy to adopt by physically active or inactive people and can be practiced at any time with empty stomach. In extreme cold, heat and rainy session, the outdoor physical activities like sports and other outdoor games restricted. So, yoga may be practiced in any environmental conditions. Safe and effective intervention programmes in post-menopausal women decreasing the adverse effects on pulmonary functions as the age advances.

Aim

The aim of the study was to evaluate the cumulative effect of practicing yoga and pranayamas on certain respiratory parameters and physical characteristics in post-menopausal women.

METHODS

This was a randomized controlled trial study which is done in post-menopausal women for the period of one year between October 2021 to November 2022 in the

Department of Physiology, MGM Medical College, Kishanganj.

Post-menopausal women (N=40) were randomly selected between the age group (46-60 years) who joined for the yoga class. Participants did not have any previous exposure to yogic exercises/practices were included in this study.

Post-menopausal women having the history of respiratory diseases were excluded from the study. All participants were from northern India, and have the same pattern of food habits. All of them were briefed on the purpose of the study and written consent of everyone was obtained. The respiratory parameters such as vital capacity, FVC, FEV₁, PEF_R, and FEF₅₀ was measured with the help of vitalograph (pneumotrac; 11). Participants practiced yoga regularly as per the yoga therapy schedule and strictly under the supervision of yoga teacher.

The trial was a single group longitudinal trial. All the participants had to practice yoga for 1 hour 15 minutes daily between 4:00 pm to 6:00 pm for 6 days in a week. The subjects were informed about the procedures in brief and were asked to relax physically and mentally for 15 minutes.

The yoga practice schedule starting from prayer and followed by suryanamaskara, pranayama, yogasana, stretching exercise, and meditation. All the parameters were recorded. The details of yoga protocol are presented in (Table 1).

Table 1: Schedule of yoga practice by the volunteers during the training period.

Yoga	Time (min)
Prayer	5
Suryanamaskara	10
Pranayama: kapal bhati, mahabandh, laybadh shvas-prashwas, nadi-shodhan, ujjayi and bhramari pranaya	15
Yogasana: shavasana, supt pawan muktasana, kandrasana, makarasana, shalabhasana, bhujangasana, mandukasan, ushtrasana, gomukhasana	30
Stretching exercise	10
Meditation	5
Total session	1 hour 15 min

Yoga was done by qualified yoga instructor. The performance of the subject was continuously supervised by the yoga instructor. All the yogic exercises were stated to be suitable for the post-menopausal yoga beginners and senior individuals included in this study. The effect of yoga was studied in two groups of 20 each. The study group were categorized into group I was control group (women not doing yoga) and group II included those regularly doing yoga for one year).

The respiratory parameters such as vital capacity (VC), FVC (forced vital capacity), FEV₁ (forced expired volume in 1 second), PEF_R (peak expiratory flow rate), and (FEF) 50% (forced expiratory flow measured at the mid-flow) were measured with the help of computerized vitalometer (pneumotrac). Respiratory rate (RR) and breath hold time (BHT) were also noted. Physical characteristics like body weight (kg) and body mass index (kg/m²) were calculated as the ratio of weight to height in meter squared.

Statistical analysis

Statistical analysis were done using one-way Anova and t-test was used to compare mean between the two groups using SPSS version 18.0 (SPSS, Chicago, IL, USA). Values were expressed in mean±standard deviation. Statistical significance was set as $p \leq 0.05$.

Ethical approval

The present study was done after obtaining the consent from the Institutional Ethical Committee.

RESULTS

A significant decrement in body weight ($p < 0.001$) and body mass index ($p < 0.01$) was noted after one-year of yogic practices as shown in Table 2. Women belonging to group II showed significant improvement ($p < 0.001$) in all the respiratory parameters such as VC, FVC, FEV₁, PEF_R, and FEF₅₀ when compared to respective control group (Table 3). Respiratory rate (RR) was decreased significantly ($p < 0.0001$) and Breath hold time (BHT) was increased significantly ($p < 0.0001$) when compared to control group (Table 3). The result shows that the one-year of yoga practices may be effective in all the mentioned respiratory and physical parameters in post-menopausal women.

Table 2: One-year of yoga therapy effect on physical parameters.

Parameters	Before yoga	After one-year of yoga therapy	P value
Body weight (kg)	72.5±1.52	55.4±1.61	<0.001
Body mass index (kg/m²)	38.8±0.83	24.6±0.55	<0.01

Values are expressed as Mean ±SD

Table 3: One-year of yoga therapy effect on respiratory parameters.

Parameters	Group I (n=20)	Group II (n=20)
VC	1.98±0.2	2.41±0.4**
FVC	2.14±0.2	2.47±0.4**
FEV₁	2.01±0.2	2.26±0.3**
PEFR/m	297.9±20.8	333.8±53.8**
FEF₅₀ L/S	2.98±0.23	3.35±0.47**
RR (br/min)	16.5±0.3	13.2±0.2***
BHT (sec)	28±0.2	44±0.4***

Note: ** $p < 0.001$; *** $p < 0.0001$: group I versus group II.

DISCUSSION

The present study was designed to determine the one-year yogic practice impact on certain respiratory and physical parameters of post-menopausal women. Yogic form of breathing exercise is Pranayama. It is an art of

prolongation and control of breath, which helps to bring the conscious awareness in breathing; to reshape breathing habits and patterns. Pulmonary function tests is a known tool for assessing the various aspects of the respiratory system and its abnormalities. Post-menopausal health complications is increasing in the modern world. Yoga practice involves the combination of physical postures, breathing, and deep relaxation promoting good health. Regular yoga practice effectively reduces the menopausal symptoms and has been considered as alternative therapy for the management of menopausal symptom.¹²⁻¹⁴ In the present study when post-menopausal women goes through yogic practice, it may increase their energy expenditure, thereafter decreased body weight and body mass index. During yoga practice, the lungs and chest inflate and deflate to the maximum possible extent and the muscles are made to work to the maximal extent. Maximum inflation and deflation during the breathing exercise is an important physiological stimulus for the release of surfactants and prostaglandins into the alveolar spaces causing the drastic rise in the lung compliance.¹⁵ This study indicated that after yoga training participants could possibly inhale more amount of air to the lungs, thus making a greater amount of oxygen available to the system, which could help in holding the breath for a longer duration and decreased respiratory rate. The autonomic function that can be consciously controlled harmonizing the sympathetic and parasympathetic nervous system together is breathing.^{16,17} The present study demonstrates that the regular yogic exercise and pranayama significantly showed the improvements in the respiratory parameters. Literature survey shows that yogic practice will cause progress in the overall respiratory functions.¹⁸⁻²¹ Further studies are needed to complete the rest parameters and to choose yoga interventions for addressing changes in body and achieving normal body composition and their post-menopausal care as healthy.

Limitations

Limitations of this study are this is a single group study and we did not monitor any diet during this study.

CONCLUSION

In light of these findings, the present study demonstrate that the one-year of yogic practice is suitable for improving pulmonary efficiency and physical characteristics in post-menopausal women. Hence, regular practice of yoga might be considered as a preventive exercise to reduce the age-related complications in respiratory functions and physical characteristics in post-menopausal women. So, more studies are required for further understanding.

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