

RESEARCH ARTICLE

Influence of Nadi Shodhana Pranayama on respiratory functions of postmenopausal women

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ABSTRACT

Background: Menopause is associated with lower lung functions and more respiratory symptoms. The menopausal transition implies a series of hormonal metabolic and psychological changes in women. They undergo lot of changes during this stage and they seek a change for this. Pranayama is an alternative voluntary breathing exercises reported to manage common postmenopausal symptoms, includes hot flashes, night sweat, shortness of breath, fatigue, pain, and psychological changes. With this background, we took up this study effect of pranayama on respiratory functions of postmenopausal women. **Aims and Objectives:** The main objective of the study was to investigate the effect of pranayama practice on respiratory functions of postmenopausal women. **Materials and Methods:** Sixty volunteers were divided into two groups, 30 interventional group and 30 control group. Pranayama group was subjected to pranayama for 12 weeks. The lung function parameters were recorded on Spiro excel, with a computerized spirometer. Five lung function parameters, it is forced vital capacity (FVC), forced expiratory volume in 1st s (FEV₁), FEV₁/FVC% peak expiratory flow rate, and maximum voluntary ventilation, were recorded before and after intervention in both groups. **Results:** The analyzed values were significantly improved in the interventional group when compared with the control group. This may be due to maximal inflation and deflation of the lungs which cause increased strength, recruitment, and endurance of respiratory musculature. **Conclusion:** Nadi Shodhana pranayama can improve respiratory function and can be suggested as an important tool for healthy living in postmenopausal women.

KEY WORDS: Pranayama; Respiratory Functions; Postmenopausal; Vital Capacity

INTRODUCTION

Menopause is one of the important events that happen in the life cycle of a woman when her reproductive capacity ceases. During this transitional phase, woman undergoes several changes with multiple symptoms. Frequently reported symptoms may fall into several categories, including physical

disturbances such as hot flushes, psychological complaints such as mood swings, and other changes that may disturb social interactions and decrease the overall quality of life.^[1] Menopause is associated with lower lung functions and more respiratory symptoms. The menopausal transition implies a series of hormonal and metabolic changes.^[2] There are many studies stating that there is decline in respiratory functions in postmenopausal women.^[3] Many researchers have done lot of studies to investigate the role of alternative therapies such as yoga and pranayama in the management of menopausal symptoms and quality of life.

Pranayama is derived from two Sanskrit words, namely, prana, which means vital force or life energy, ayama means to prolong. Nadi Shodhana pranayama is a part of hatha yoga

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that can purify the nadis through alternate nostril breathing. Shodhana is related “to purify.” The alternate nostril breathing balances the flow of vital energy as well as the flow of breath through the right and left nostrils.^[4] Yoga is an ancient body-mind science used effectively in various health disorders affecting almost all the major organ system including cardiovascular, respiratory, neuroendocrine, gastrointestinal, and musculoskeletal system.^[5-7]

There are studies stating that pranayama alters various inspiratory and expiratory lung reflexes and interacts with central neural element to develop a new homeostasis in the body and mind.^[8] Practice of pranayama stretches the lung tissue producing inhibitory signals by actions of slowly adapting the receptors and hyperpolarizing the currents. These signals from cardiorespiratory region are believed to synchronize neural elements in the brain causing changes in the autonomic nervous system.^[9] With the above-mentioned evidence, we did our study on influence of Nadi Shodhana pranayama on respiratory functions of postmenopausal women.

MATERIALS AND METHODS

This study was undertaken in Vinayaka Mission’s Kirupananda Variyar Medical College and Hospital, Salem, Tamil Nadu, India, for over a period of 6 months. The project was approved by the Institutional Ethics Committee of Vinayaka Mission’s Kirupananda Variyar Medical College and Hospital. Sixty postmenopausal women in the age group of 45–55 years were selected for the study from in and around Salem, Tamil Nadu, India. Their postmenopausal status and eligibility for the study were determined using structured questionnaire. A written informed consent was taken from all the subjects. The subjects with cardiac disease, tuberculosis, asthma, occupational lung disease, chronic obstructive pulmonary disease, common cold, or cough who practiced yoga for the past 1 year were excluded from the study. The subjects were divided into two groups – 30 control and 30 interventional groups. The interventional group was trained with Nadi Shodhana pranayama by a yoga trainer for 30 min 5 days a week. Nadi Shodhana was practiced in empty stomach morning 7 AM–7.30 AM in a clean, quiet, and pleasant room.

Different Steps for Alternate Nostril Breathing^[10]

- First step: Right nostril closed with thumb first inhale and then exhale through the left nostril and repeat this for 5 times. Now remove the hand and breathe through both nostril for 5 times
- Second step: Left nostril closed with ring and little finger inhale first followed by exhale through the right nostril and repeat this for 5 times. Remove the hand and breathe through both nostril for 5 times
- Third step: Right nostril closed with the thumb and breathe in through the left nostril, close the left nostril

and breathe out through the right nostril, repeat for 5 times, and finally remove the hand and breathe through both nostril for 5 times. Twelve weeks of regular practice of Nadi Shodhana pranayama were done after which all the parameters were recorded.

A portable, computerized spirometer was used to record the lung function test and three readings were recorded and the best of three readings was considered. The parameters recorded were forced vital capacity (FVC), forced expiratory volume in 1st s (FEV₁), peak expiratory flow rate (PEFR), FEV₁/FVC, and maximum voluntary ventilation (MVV). The data were analyzed by SPSS version 22.0. Differences in mean were tested using Student’s paired “t-test.”

RESULTS

The result is expressed in as Mean ± SD before and after performing “Nadi Shodhana Pranayama.” The values obtained before and after intervention were compared using the Student’s paired “t-test”. *P* < 0.05* accepted as significant difference between the compared values. The respiratory parameters which were recorded before and after intervention in the control group and interventional group were statistically analyzed using Student’s paired “t-test.” Table 1 represents the control group which did not show any significant change in respiratory parameters. Table 2 represents the interventional group the subjects who practiced Nadi Shodhana pranayama show significant improvement in

Table 1: Respiratory function test in control group

| Parameter | Before intervention | | After intervention | | P-value |
|---------------------------|----------------------|-------|--------------------|-------|---------|
| | Mean | STD | Mean | STD | |
| | FEV ₁ (L) | 1.80 | 0.44 | 1.70 | |
| FVC (L) | 2.48 | 0.57 | 2.45 | 0.58 | 0.45 |
| FEV ₁ /FVC (%) | 65.26 | 2.28 | 65.22 | 2.30 | 0.62 |
| PEFR (L/S) | 286.17 | 24.32 | 286.15 | 24.31 | 0.76 |
| MVV | 75.20 | 29.04 | 75.40 | 28.01 | 0.54 |

FVC: Forced vital capacity, FEV₁: Forced expiratory volume in 1st s, PEFR: Peak expiratory flow rate, MVV: Maximum voluntary ventilation

Table 2: Respiratory function test in interventional group

| Parameter | Before intervention | | After intervention | | P-value |
|---------------------------|----------------------|-------|--------------------|-------|----------|
| | Mean | STD | Mean | STD | |
| | FEV ₁ (L) | 1.50 | 0.44 | 1.63 | |
| FVC (L) | 2.12 | 0.56 | 2.24 | 0.77 | <0.05* |
| FEV ₁ /FVC (%) | 69.30 | 2.22 | 71.29 | 3.20 | <0.076 |
| PEFR (L/S) | 284.70 | 24.33 | 285.66 | 24.30 | <0.001** |
| MVV | 75.36 | 29.20 | 79.48 | 24.01 | <0.01* |

FVC: Forced vital capacity, FEV₁: Forced expiratory volume in 1st s, PEFR: Peak expiratory flow rate, MVV: Maximum voluntary ventilation

the respiratory parameters FVC ($P < 0.05$), FEV_1 ($P < 0.05$), PEFR ($P < 0.001$), and MVV ($P < 0.01$).

DISCUSSION

This study was designed to determine the influence of 12 weeks of Nadi Shodhana pranayama practice on respiratory functions of postmenopausal women. We found that the parameters such as FEV_1 , FVC, FEV_1/FVC , PEFR, and MVV increased significantly after pranayama in postmenopausal women. These changes may be due to the alteration in autonomic functions and improvement in stretch of respiratory muscle caused by Nadi Shodhana pranayama. Lung functions depend on many factors including neuropsychological factors and strength of respiratory muscles. The improvement in physical strength and fitness caused by pranayama may be related to several factors such as muscle strength, flexibility, cardiorespiratory fitness, body composition, and pulmonary functions.^[11] Nadi Shodhana pranayama promotes stretching of respiratory muscle, with opening of small airways, strengthens the diaphragm, reduces the work of breathing, and strengthens the respiratory muscle and abdominal muscles so that there is an improved gas exchange and oxygenation which gives good breath control among young people.^[12]

Nadi Shodhana pranayama brings a balance in autonomic nervous system, the subjects are not only trained to breathe but also trained to keep their focus on act of breathing leading to concentration. This diverts their attention from all worries and distresses within them. Hence, the parasympathetic activity overrides sympathetic activity and improves lung inflation which again can improve the respiratory functions.^[12] With our study, it is event that Nadi Shodhana pranayama can improve the respiratory functions in postmenopausal women.

CONCLUSION

Nadi Shodhana pranayama can improve respiratory functions and this can be suggested as an important tool for healthy living in postmenopausal women.

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