Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(1), 388-392 | ISSN:2251-6727

Combined Effects of Yoga and Physical Therapy on Respiratory Functions in Postmenopausal Diabatic Women

D. Varalakshmi

Associate Professor and Vice principal, Department of Apollo college of Physiotherapy, KNR University of Health Sciences

Dr. K. Rekha

Associate Professor, Department of Saveetha college of Physiotherapy, Saveetha University

(Received: 27 October 2023 Revised: 22 November Accepted: 26 December)

KEYWORDS

Yoga and physical therapy; Respiratory Function; Spirometer FEV1, FVC, FEV1/FVC RATIO, PEFR

Abstract: Yoga activities may lessen cardiac problems and avoid diabetes. This study assessed the reaction time, metabolic markers, and wellness score of postmenopausal diabetes patients to compare the benefits of yoga and therapy. The data supporting a link between lung function and menopause is sparse and contradictory. This study aims to assess postmenopausal women's pulmonary function test (PFT). PFTs were measured using a digital spirometer in 49 premenopausal and 46 postmenopausal women. A number of PFT metrics showed a significant reduction. Conclusions: Low lung function is related to menopausal state.

Introduction

Numerous scientific studies demonstrate the benefits of yoga and physical therapy for maintaining health and treating psychosomatic diseases. Yoga and physical therapy's scientific foundation modifies the physiology of the body[1]. Adjustments to one's yogic lifestyle assist prevent and manage lifestyle disorders. Modern study has focused on the psychophysiological effects of yoga and physical therapy as it transcends physical therapy. Yoga and physical therapy reduce “blood pressure, body weight, glucose levels, and high cholesterol” [2]. A nine-day stress management program and lifestyle modification based on yoga and physical therapy decreases the cardiovascular disease as well as diabetes risk factors.

Physical therapy and yoga can lower hypertension, dyslipidemia, and diabetes. Yoga and physical therapy enhance insulin sensitivity and diminish the correlation between body weight and insulin sensitivity with long-term practice. Yoga and physical therapy are safe, simple to learn, and accessible to everyone, even the ill, old, and disabled, with no negative side effects and several advantages that too including pranayama are reported [3-8].

Nagarathna and Nagendra demonstrated a substantial reduction in the number of asthma attacks among yoga-trained asthma patients compared to the control group [4]. Several studies [10,11] have been undertaken to comprehend the alterations that occur throughout several yogic exercises. A research on efficacy of yoga for the therapy of the bronchial asthma revealed that yoga improves both subjective and objective outcomes in bronchial asthma [9].

This regimen of yoga may modify bronchioles and alveoli environment to improve transport and diff (specifically the alveolo-capillary membrane). The main objective of present study is to evaluate yogic practices effect on respiratory functions in postmenopausal diabetes women.

Materials & Methods

The institute's Research and Ethics Councils approved the trial's enlarged investigation of the effects of yoga and physical therapy to determine eligibility of the respiratory system, a clinical assessment and general physical examination were undertaken at the Apollo College of Physiotherapy in Hyderabad. Outpatients from the Department of Gynecology and Obstetrics and those who volunteered for the study comprised the subjects. To determine their eligibility, a normal physical & clinical examination of their respiratory system have been performed. All eligible participants supplied

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(1), 388-392 | ISSN:2251-6727

written informed consent. However only 95 out of 115 women tested met the requirements for eligibility.

According to the menstrual history of patients, two groups were developed:

- Group I (n=49) consisting of healthy premenopausal women (under the age of 40) with normal menstrual periods.
- Group II (n = 46) consisting of 55-year-old postmenopausal women in good health (defined as individuals who had not had a period in the previous year).

According to their declarations, the ages of eligible individuals were recorded in years. Height and weight were measured in milli-meters and kilograms, respectively. The BSA or Body Surface Area has been measured in square meters, considered were three values from a portable, computerized spirometer. PFTs deliver objective, measurable data of the spirometry tests & pulmonary function dependent upon forced expiration could detect respiratory system changes. The following parameters were measured: "FVC (forced vital capacity), forced expiratory volume in 0.5 seconds (FEV0.5), forced expiratory volume in 1 second (FEV1), forced expiratory volume in 3 seconds (FEV3), peak expiratory flow rate (PEFR), mean forced expiratory flow (FEF) during middle half of FVC".

In addition of calculating and displaying actual PFT values, spirometer software also helps in displaying and generating PFT values in order to get a better understanding of PFT values. These PFT observed values were derived from the mean values (large group of healthy individuals). Data analysis was performed using SPSS, and t-test for calculating mean values. P=0.05 reflected statistical significance.

Results

Group of postmenopausal women had mean age "51 ±2.49 years", having greater BSA & mean body weight (Table 1).

Table 1. Mean age, weight, height, and body surface area of group I and group II

Parameter	Group I (n = 49)	Group II (n = 46)
Age (years)	42.97 ± 2.31	51 ± 2.49*
Weight (kg)	61.51 ± 10.00	69 ± 11.55†
Height (cm)	153.75 ± 5.56	154.19 ± 6.33‡
BSA (m^2)	1.58 ± 0.12	1.67 ± 0.14†

The data is presented as mean ± standard deviation
*P = 0.0000
†P < 0.0005
‡No significant
BSA: body surface area

While comparing the average heights between the two groups, Group II respondents' values were lower when flow rates and PFT parameters were compared (Table 2, 3).

Table 2. Effect of menopause on timed vital capacity parameters

Parameter (L)	Group I (n = 49)	Group II (n = 46)
FVC	3.27 ± 0.64	2.83 ± 0.78*
$FEV_{0.5}$	1.15 ± 0.51	0.47 ± 0.45†
FEV_1	2.28 ± 0.48	1.25 ± 0.55†
FEV_3	2.58 ± 1.40	2.25 ± 1.00‡
$FEV_{0.5}$/FVC	35.96 ± 16.29	18.15 ± 18.25†
FEV_1/FVC	70.10 ± 10.76	45.79 ± 20.46†
FEV_3/FVC	74.74 ± 40.37	78.48 ± 31.88‡
FVC time (minutes)	3.46 ± 0.91	4.07 ± 1.22*

The data is presented as mean ± standard deviation
*P < 0.005
†P = 0.0000
‡No significant
FVC: forced vital capacity, $FEV_{0.5}$: forced expiratory volume in half second, FEV_1: forced expiratory volume in first second, FEV_3: forced expiratory volume in 3 seconds

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(1), 388-392 | ISSN:2251-6727

Table 3. Flow rates of group I and group II

Parameter (L/seconds)	Group I (n = 49)	Group II (n = 46)
PEFR	4.79 ± 1.39	3.32 ± 1.42*
$FEF_{25-75\%}$	2.39 ± 0.83	1.48 ± 0.47*
$FEF_{25\%}$	4.39 ± 1.34	2.74 ± 1.42*
$FEF_{50\%}$	3.13 ± 1.09	1.91 ± 0.72*
$FEF_{75\%}$	1.01 ± 0.49	0.72 ± 0.30†
MVV (L/minutes)	77.14 ± 19.75	51.70 ± 16.38*

The data is presented as mean ± standard deviation
*P = 0.0000
†P < 0.0005
PEFR: peak expiratory flow rate, $FEF_{25-75\%}$: forced expiratory flow 25% to 75%, $FEF_{25\%}$: forced expiratory flow 25%, $FEF_{50\%}$: forced expiratory flow 50%, $FEF_{75\%}$: forced expiratory flow 75%, MVV: maximum voluntary ventilation

The postmenopausal group had significantly lower mean observed values of the "FVC, FEV0.5, FEV1, FEV0.5/FVC, and FEV1/FVC", although FVC time was longer (Table 2).

Between 2 groups, ratio of FEV3 to FVC did not differ significantly. All the flow rate measurements, including "PEFR, FEF25-75%, FEF25%, FEF50%, FEF75%, and MVV (L/min)", were found to be lower in the postmenopausal women shown in (Table 3). To account for the impact of age and BMI on PFTs, predicted values proportions of all observable, parameters of spirometer were compared between the 2 groups. Except for FEF75%, the results were consistent with the rest of our study's findings (Fig. 1).

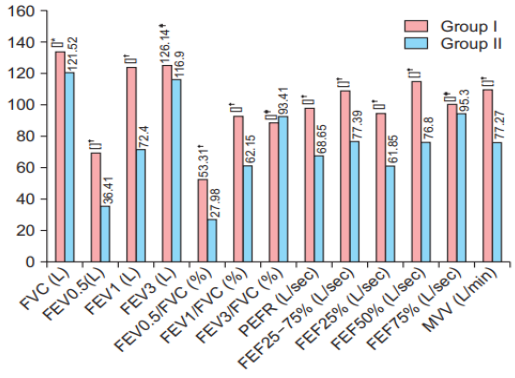

Fig. 1. Comparison of pulmonary function tests as percentage of predicted values between subjects of group I and group II. *Significant P < 0.00. †Highly significant P < 0.0001. ᵗNo significant, P > 0.05.

None of the literature studies had concentrated on the menopause impact on the pulmonary function's deterioration in the Indian population. Very few information is available on the potential changes within respiratory health whenever the women reach menopausal state. The menstrual cycle finally ends, and menopause is a permanent cessation of ovarian follicular activity. Decreased levels of estrogen and progesterone may result in weakened muscles, reduced smooth muscle relaxation in the lungs, and greater compression of the thoracic spine from osteoporosis. Lung volume and capacity measurements are regarded as important physical health indicators. By using PFTs, we can establish normal values for a variety of bronchopulmonary functions, as well as identify the kind and severity of bronchopulmonary dysfunctions. The postmenopausal women in Group II had a mean age of 51± 2.49 years.

7~12 Postmenopausal women's mean body weight was higher (P = 0.001), which was likely caused by decreased estrogen levels. Although both groups' average heights were similar (P = 0.719), postmenopausal women's average BSA was substantially greater (P = 0.001). The postmenopausal women's increased mean body weight may be to blame for this rise. Due to ovarian hormones lack postmenopausal women face the aging and physiological impacts including lung function. Even globally, there is very little information on the impact of menopause on pulmonary functions. Further we looked into the potential link between menopausal status and lung health.

1. FVC

FVC directly relates to the volume of air inhaled. It is the most significant PFT and is particularly sensitive to conditions that impact the mechanical and elastic properties of the lung. Either restriction or obstruction can result in a poor FVC.

2. FEV0.5

It is a measure of the pulmonary ventilation since it shows the volume of air expelled with a maximum effort within first half second of the FVC maneuver. In our study, Group II FEV0.5 values were substantially lower than the premenopausal women (P 0.0001), which was found. There was no research on this parameter, according to a search of the literature.

3. FEV1

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(1), 388-392 | ISSN:2251-6727

In addition to being the most often used spirometric measure, FEV1 (normal value 80%) continues to be the most clinically valuable and validated test of the ventilatory function for the diagnosis and treatment of an airflow limitation. When determining whether a lung condition is restrictive or obstructive, FEV1 is considered as a globally reliable indicator. In the current study, postmenopausal women's observed mean FEV1 values were considerably lower than those of the premenopausal women (P 0.0001).

Premenopausal women's observed mean indicated as FEV1 as a percentage of expected value was substantially higher than that of the postmenopausal group (124.85 vs. 72.40%, P 0.0001). The difference in FEV1 between postmenopausal and premenopausal women is probably caused by lower levels of progesterone and estrogen.

4. FEV3

In the current study, observed mean FEV3 values of the postmenopausal women were compared with the premenopausal women (P = 0.191). Regarding menopause effect upon the parameter, the literature contains no reports.

5. FEV0.5/FVC (%), FEV1/FVC (%), FEV3/FVC (%)

Other measures for information regarding ventilatory functions include FEV0.5/FVC (%), FEV1/FVC (%), and FEV3/FVC (%).

6. FEV0.5/FVC

When compared to premenopausal women, postmenopausal women's observed mean FEV0.5/FVC ratios were significantly lower (P 0.0001). A review of the literature turned up no works pertaining to the parameter.

7. FEV1/FVC

Regardless of lung size, the volume of air expelled during first second is a rather constant percentage of FVC. This ratio, which is typically stated as a percentage, falls between 75% and 85% in healthy adults. The FEV1/FVC ratio, which distinguishes between individuals with restrictive and obstructive ventilator anomalies, is a much more helpful an indicator than FVC alone. In the current study, the postmenopausal women's mean FEV1/FVC ratio was considerably lower than that of the premenopausal women (45.79% vs. 70.10%, P 0.0001), indicating an obstructive pattern. Moreover, premenopausal women's FEV1/FVC as a percentage of expected value performed much better than postmenopausal women's (93.24% vs. 62.15%, P 0.0001).

8. FEV3/FVC

Individuals who have a lower FEV3/FVC ratio are more likely to develop blockage. In the current study, observed mean FEV3/FVC values of the postmenopausal women's were comparable to the ones for premenopausal women (P = 0.619).

9. PEFR

A single breath is used to evaluate the ventilatory capacity using the PEFR technique. It greatly depends on how good the major airways are. Only in cases of moderate to severe airway blockage does it decrease abnormally. 24 Peak flow rate has the important advantage of being a physiologically well-defined metric that is reasonably simple for the subject to understand. Post-menopausal women has lower observed mean PEFR values than pre-menopausal women (P 0.0001), as per the present study.

10. MVV

MVV is indeed the maximum air volume that could be taken in and exhaled in one minute. It is an accurate indication of the lung’s mechanical efficiency and is a test of dynamic lung function. Moreover, MVV is less sensitive to that of FEF25-75%. In this study, the postmenopausal women had a significantly lower mean MVV (P 0.0001).

11. FVC time

In comparison to their projected values, some patients with obstructions have FVCs that are rather normal. Unfortunately, it typically takes a long time for their FVC to expire. In the current study, postmenopausal women required substantially longer FVC times (min) than premenopausal women (P = 0.006). There were no reports on this parameter found in the literature search that was done. PFT assess the degree of pulmonary impairment. In postmenopausal women, lung function quickly deteriorates. Airway smooth muscle relaxation has been linked to estrogen and progesterone, which lessens the respiratory muscles' contractile response. The formation of collagen may be significantly influenced by estrogen.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(1), 388-392 | ISSN:2251-6727

Conclusion

Yoga practice resulted in a considerable improvement in the pulmonary function, as indicated by a rise in "peak expiratory flow rate (PEFR), vital capacity (VC), forced vital capacity (FVC), and forced expiratory volume in the first second (FEV1) (FEV1)". The study helps in understanding of ovarian hormones biological role in altering airways. In order to address postmenopausal women health issues, it is important to establish targeted health education initiatives.

References

1. ADA, A. D. A. (2019). Introduction: Standards of Medical Care in Diabetes—2019. Diabetes Care, 42(Supplement 1), S1–S2. https://doi.org/10.2337/dc19-Sint01.
2. Boyle, M. (2011). Advances in functional training (1st ed.). On Target Publications.
3. Haddad, M., Stylianides, G., Djaoui, L., Dellal, A., & Chamari, K. (2017). Session-RPE Method for Training Load Monitoring: Validity, Ecological Usefulness, and Influencing Factors. Frontiers in Neuroscience, 11(NOV). https://doi.org/10.3389/fnins.2017.00612.
4. IDF, I. D. F. (2020). IDF Diabetes Atlas. 2020. https://www.idf.org/e-library/epidemiology-research/diabetes-atlas.
5. Maillard, F., Rousset, S., Pereira, B., Traore, A., de Pradel Del Amaze, P.,Boirie, Y., Duclos, M., & Boisseau, N. (2016). High-intensity interval training reduces abdominal fat mass in postmenopausal women with type 2 diabetes. Diabetes and Metabolism, 42(6), 433–441. https://doi.org/10.1016/j.diabet.2016.07.031.
6. McEniery, C. M. (2020). Transitioning the Menopause. Arteriosclerosis, Thrombosis, and Vascular Biology, 40(4), 850–852. https://doi.org/10.1161/ATVBAHA.120.313980.
7. Monteleone, P., Mascagni, G., Giannini, A., Genazzani, A. R., & Simoncini, T. (2018). Symptoms of menopause —global prevalence, physiology and implications. Nature Reviews Endocrinology, 14(4), 199–215. https://doi.org/10.1038/nrendo.2017.180.
8. Rochlani, Y., Pothineni, N. V., Kovelamudi, S., & Mehta, J. L. (2017). Metabolic syndrome: pathophysiology, management, and modulation by natural compounds. Therapeutic Advances in Cardiovascular Disease, 11(8), 215–225. https://doi.org/10.1177/1753944717711379.
9. Schroeder, E. C., Franke, W. D., Sharp, R. L., & Lee, D. (2019). Comparative effectiveness of aerobic, resistance, and combined training on cardiovascular disease risk factors: A randomized controlled trial. PLOS ONE, 14(1), e0210292. https://doi.org/10.1371/journal.pone.0210292.
10. Stefanska, A., Bergmann, K., & Sypniewska, G. (2015). Metabolic Syndrome and Menopause. Advances in Clinical Chemistry, 72, 1–75. https://doi.org/10.1016/bs.acc.2015.07.001.
11. Zaw, J. J. T., Howe, P. R. C., & Wong, R. H. X. (2018). Postmenopausal health interventions: Time to move on from the Women's Health Initiative? Ageing Research Reviews, 48(October), 79–86. https://doi.org/10.1016/j.arr.2018.10.005.