

Research Article

To Compare the Effect of Aerobic Exercise and Yoga on Musculoskeletal Fitness, Fatigue, Quality of Life, and Endocrine Parameters in Women with Polycystic Ovary Syndrome: Study Protocol for an Experimental Study

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Introduction

Polycystic Ovary Syndrome (PCOS) is a heterogeneous disorder characterized by hyperandrogenism and chronic anovulation [1]. Polycystic Ovary Syndrome (PCOS) is the most prevalent reproductive disorder causing significant health consequences for women impairing quality of life and increasing morbidity [2]. Depending on diagnostic criteria, 6% to 20% of reproductive-aged women are affected. Symptoms of PCOS arise during the early pubertal years. Both normal female pubertal development and PCOS are characterized by irregular menstrual cycles, anovulation, and acne [1]. PCOS is reported as the cause of anovu-

Abstract

Polycystic Ovary Syndrome (PCOS) is a heterogeneous disorder characterized by hyperandrogenism and chronic anovulation. Physical activity is associated with lower depression in women with PCOS and is likely to be beneficial to their mental health. Furthermore, in women with PCOS, the practice of resistance exercise increases basal metabolism and promotes an increase in lean mass, improves insulin sensitivity, and promotes a decrease in lipid levels, as well as a reduction in blood pressure and an improvement in glucose metabolism. Physical activity also provides relaxation and helps in hormonal balance. Both aerobics and yoga have a positive impact on patients with polycystic ovary disease this study aims to compare the effect of aerobic exercise and yoga on musculoskeletal fitness, fatigue, quality of life, and endocrine parameters in women with Polycystic ovary syndrome.

Method: We present a study protocol for an experimental study in which women diagnosed with polycystic ovary disease in age group of 18-25 years will be enrolled. Participants were divided into 2 groups; aerobic exercise protocol will be followed for group one and yoga will be followed for group 2 both groups will be tested again with sit and reach test, fatigue symptoms inventory, SF-36, waist-to-hip ratio, and hormonal test (A.M.H., LH, FSH, testosterone and prolactin). After 1 month of follow-up sit and reach test, fatigue symptom inventory, SF-36, waist-to-hip ratio and hormonal readings (A.M.H., LH, FSH, and testosterone) will be taken again.

Conclusion: The conclusion of this study will provide insight to provide rehabilitation measures that will be easy to use and will provide musculoskeletal fitness, and hormonal balance, improve quality of life, and reduce fatigue in patients with polycystic ovary disorder.

Keywords: Hormone; Yoga; Aerobics; Fatigue; Quality of life

latory infertility in 70% of women, making it the most common cause of ovulatory dysfunction. Infertility was reported in 72% of women with PCOS compared with 16% in women without PCOS. Women with PCOS may also have an increased risk of miscarriage and pregnancy complications. There is a significantly higher risk of developing gestational diabetes, pregnancy-induced hypertension, preeclampsia, and caesarean section. Maternal complications appear to be frequent in women with hyperandrogenic PCOS compared with women with normal androgenic PCOS [2]. PCOS is associated with an increased risk

of sexual dysfunction, reduced quality of life, and altered emotional state [3]. The symptoms of PCOS include menstrual cycle disturbance, hirsutism, acne, obesity, and psychological issues. PCOS is associated with an increased risk of developing type II DM and endometrial cancer.

Possible late sequelae of PCOS are Type-II diabetes mellitus, dyslipidaemia, hypertension, cardiovascular disease, and endometrial carcinoma. The symptoms of PCOS have direct impacts on psychological well-being [4]. The diagnosis of PCOS is made based on Rotterdam criteria. The diagnosis of PCOS is made if two of the three criteria are met: 1.) clinical or biochemical features of hyperandrogenism, 2.) Oligo-ovulation or anovulation (i.e. menstrual cycle disturbances), 3.) Polycystic ovaries on ultrasound, once appropriate investigation has been performed to exclude other causes of menstrual disturbance and androgen excess [4].

There are many successful pharmacological and non-pharmacological treatments of PCOS available. Combined Oral Contraceptive Pills (COCPs) are recommended as first-line medical treatment for the management of hyperandrogenism and regulation of menstrual cycles in women with PCOS. The role of antiandrogens in the treatment of hirsutism in PCOS is controversial; however, there is some evidence that flutamide and spironolactone reduce hirsutism. Because of the metabolic features of PCOS such as insulin resistance and hyperinsulinemia, insulin-sensitizing agents, especially metformin, have been used as a treatment option for PCOS. Surgical interventions are also available such as laparoscopic ovarian drilling, and bariatric surgery [2]. A lifestyle change is considered the first line of treatment for obese women with PCOS as a nonpharmacological treatment. Physical exercise also leads to greater social participation, resulting in better bio-psychophysical well-being and improved QoL. Physical activity is associated with lower depression in women with PCOS and is likely to be beneficial to their mental health. Furthermore, in women with PCOS, the practice of resistance exercise increases basal metabolism and promotes an increase in lean mass, improves insulin sensitivity, and promotes a decrease in lipid levels, as well as a reduction in blood pressure and an improvement in glucose metabolism. In women with PCOS, the preservation of lean mass is important for the promotion of weight reduction and the increase in basal metabolism, so regular physical exercise has significant benefits for these women [5].

Aerobic exercise if initiated at an early stage of disease may have beneficial effects in subjects with PCOS. Aerobic exercises help to burn calories, aids in vital control, increase serum HDL cholesterol, reduce weight, and may improve insulin resistance. In women with PCOS and obesity, weight loss through diet control improves pregnancy rates and normalizes hyperandrogenaemia weight loss by exercise and diet is an important target in lifestyle modification programs capable of inducing an improvement in reproductive function among obese women with PCOS [6]. Aerobic exercises also improve the quality of life in women with PCOS [7]. Yoga is a form of holistic mind-body medicine developed thousands of years ago, and is known to reduce stress and sympathetic tone. A holistic yoga program for adolescent PCOS is significantly better than a physical exercise program in decreasing Anti-Mullerian Hormone (AMH), Luteinizing Hormone (LH), testosterone, and increasing menstrual frequency, with no change in body weight, FSH, or prolactin. Yoga may contribute to the reduction/normalization of the sympathetic nervous system/hypothalamic-pituitary axis activation

and therefore have beneficial effects on the endocrine system in PCOS [8]. Yoga (asana) exercises were effective in improving some clinical signs (hirsutism) as well as anthropometric parameters (abdomen and hip circumference) in infertile women [9]. But there is little evidence supporting this. Therefore, this study aimed to investigate to compare the effect of aerobic exercise and yoga on musculoskeletal fitness, fatigue, quality of life, and endocrine parameters in women with PCOS.

Objectives

The main objective is to compare the effect of aerobic exercise and yoga on musculoskeletal fitness, fatigue, quality of life, and endocrine parameters in women with Polycystic ovary syndrome but other operational objectives are as follows:

1. To study the effect of aerobic exercise on musculoskeletal fitness, fatigue, quality of life, and endocrine parameters of women with polycystic ovary syndrome.
2. To study the effect of yoga on musculoskeletal fitness, fatigue, quality of life, and endocrine parameters of women with polycystic ovary syndrome.
3. To study the effect of aerobic exercise and yoga on musculoskeletal fitness, fatigue, quality of life, and endocrine parameters of women with polycystic ovary syndrome.

Methodology

Study Design

This is designed as an experimental study in which women with polycystic ovary syndrome will be recruited from Pt. B.D.S Sharma University of Health Sciences Rohtak, Haryana.

Participants

Inclusion criteria

- Women diagnosed with PCOS.
- 18 -25 years women.

Exclusion criteria

- History of smoking.
- Pregnancy.
- History of diabetes.
- History of congenital adrenal hyperplasia.
- History of thyroid diseases.
- History of musculoskeletal disorders.

Study Period

The planned duration of the study is 12 months. Inclusions started in August 2023. The quantitative phase will go on for 10 months and the last 2 months will focus on integrating results from both phases, to provide a global interpretation and discussion of the results of the study.

Sample Size

A study by Eduardo Caldas Costa et al. in 2018 [7] observed that the mean value of pre and post-tests was 6.96 and 5.40 respectively, while the standard deviation of pre and post-tests was 2.25 and 1.64 respectively. Taking these values as a refer-

ence, the minimum required sample with 80% power of study and 5% level of significance is 23.95 subjects. So, our sample size will be taken as 30 subjects in each group.

Outcome Measures and Variables

Measurement of musculoskeletal fitness: It will be measured by the sit and reach test, participants will sit on the floor with their feet approximately hip wide against the testing seat and reach the box. They kept their knee extended placed the right hand over the left, and slowly reached forward as far as they could reach. A standard meter scale will be placed on the sit and reach box for each test [10].

Measurement of fatigue: Fatigue measured by Fatigue Symptoms Inventory (FSI) FSI is a 14-item self-report measure for measuring the intensity, frequency, and impact of symptoms of fatigue on a woman's quality of life. A higher score indicates more fatigue symptoms [11].

Measurement of quality of life: It will be measured by SF-36. Physical function, social functioning, role constraints due to physical difficulties, role restrictions owing to emotional problems, mental health, vitality, pain, and general health perception are all evaluated in the SF-36 questionnaire. Each SF-36 subscales have a total score that spans from 0-100. A greater score indicates better HRQOL [12].

Measurement of endocrine parameters: It will be measured by AMH, FSH, LH, and testosterone levels.

Procedure

Informed consent forms will be provided and clearly explained to the patients who will participate in the study. We will divide all women into two groups (group 1 and group 2). Before intervention baseline readings of both groups will be taken for musculoskeletal fitness by sit and reach, fatigue by fatigue symptoms inventory, quality of life by SF-36, waist-to-hip ratio, and endocrine parameter by hormonal test (A.M.H., LH, FSH, testosterone and prolactin). Group 1 will be given aerobic exercises (each aerobic session will be 30 min.) for 5 days per week for 6 weeks. Group 2 will be given yoga (each yoga session will be 30 min.) for 5 days per week for 6 weeks. After 6 weeks of intervention of aerobic exercise to Group-1 and yoga to Group-2 both groups will be tested again with sit and reach test, fatigue symptoms inventory, SF-36, waist-to-hip ratio, and hormonal test (A.M.H., LH, FSH, testosterone and prolactin). After 1 month of follow-up sit and reach test, fatigue symptom inventory, SF-36, waist-to-hip ratio and hormonal readings (A.M.H., LH, FSH, and testosterone) will be taken again.

Study Protocol

Aerobic exercise protocol [13] (Group – 1)

Aerobic exercise protocols

Aerobic exercise group (Time)

Group lecture (8 min.)

Lecture on conventional modern medical concepts about a healthy lifestyle including diet, exercise

Warm up (6 min.)

Mild jump

Moderate jump

High jump

Jumping jack

Standing gluteal kick or butt kick High knee jumps

Alternate bend leg touch

Stretching exercise (6 min.)

Neck stretching and rotation

Biceps and triceps stretch

Pectoralis stretched

Shoulder rotation

Side bending

Hamstring/ quadriceps stretched

Latissimus dorsi stretch

Strengthening exercise (6 min.)

Shoulder flexor

Shoulder internal rotator

Knee flexor/knee extensor

Lunges

Aerobics exercise (6 min.)

Dance marching

Jumping jack

Biceps/triceps move

Single and double-step touch

Front and back touch

Side and back bending touch

Side leg raise

Forward leg raise touch

Cooldown (6 min.)

Breathing exercise

Sitting forward bend and touch

Relaxing hamstring and quadriceps muscles

Cobra stretched

Butterfly stretched

Yoga protocol⁸ (Group-2)

Yoga group (Time)

Group lecture (8 min)

Lectures, in the form of cognitive restructuring based on the spiritual philosophy underlying yogic concepts.

Surya Namaskar (Sun Salutation) (2 min)

Prone asanas

Cobra pose (Bhujangasana) (1 min)

Locust pose (Salabhasana) (1 min)

Bow pose (Dhanurasana) (1 min)

Standing asanas

Triangle pose (Trikonasana) (1 min)

Twisted angle pose (Parsva-konasana) (1 min)

Spread-leg intense stretch (Prasarita padottanasana) (1 min)

Supine asanas

Inverted pose (Viparita Karni) (1 min)

Shoulder stand (Sarvangasana) (1 min)

Plough pose (Halasana) (1 min)

Sitting asanas

Sitting forward stretch (Paschimottanasana) (1 min)

Fixed-angle pose (Baddha-konasana) (1 min)

Garland pose (Malasana) (1 min)

Guided relaxation (Savasana) (10 min)

Breathing techniques (Pranayama)

Sectional breathing (Vibhagiya-Pranayama) (1 min)

Forceful exhalation (Kapala Bhati) (1 min)

Right-nostril breathing (Suryanuloma Viloma) (1 min)

Alternate-nostril breathing (Nadi suddhi) (1 min)

OM meditation (OM Dhyana) (2 min)

Data Collection

Subjects will be recruited from the Gynaecology OPD of Pt. B.D. Sharma PGIMS, Rohtak.

Statistical Analysis

Data will be analysed using statistical analysis software like SPSS. Mean \pm SD will be calculated for demographic data. Categorical variables will be expressed as frequencies and percentages. Paired t-test will be used to compare different variables in different groups for differences. Another suitable statistical test will be used as per requirements.

Discussion

Previous studies indicate that physical exercise and yoga showed positive results on quality of life in women with PCOS. Mohseni M et al. 2021 [9] conducted an experimental study of yoga's effect on anthropometric indices and polycystic ovary syndrome symptoms in women undergoing infertility treatment. They gave yoga to the intervention group for 6 weeks and each session was for 90 min. They give two sessions per week at the gym by the instructor and five sessions per week at home by participants themselves. Results showed that yoga exercises for 6 weeks and 90 min. per session were effective in improving hirsutism, and anthropometric parameters in infertile women. Ribeiro V B et al. 2019 [3] conducted an experimental study, "Continuous versus intermittent aerobic exercise in the improvement of quality of life for women with polycystic ovary syndrome. The treatment session was for 16 weeks, and

it included aerobic exercises. treadmill was used. The control group did not receive any treatment. Results showed that both protocols were equally effective in the improvement of physical, emotional, and social functioning, etc. Waist circumference, Hip circumference, and testosterone levels were decreased in the continuous aerobic training group, and waist circumference, waist-to-hip ratio, and testosterone levels were decreased in the intermittent aerobic training group, and waist circumference increased in the control group. One more study was conducted by Costa E C et al. 2018 [7] to assess the effect of aerobic training on quality of life in women with polycystic ovary syndrome. They gave supervised aerobic exercise training intervention to the exercise group 3 times/week for 16 weeks. Supervised aerobic exercise protocol included the 5 min. warm-up and 5 min. cool down and standard outdoor 400m. track. Each supervised aerobic exercise session was for 40 min. they concluded that supervised aerobic exercise training improved the Health-Related Quality of Life (HRQL), cardiorespiratory fitness, and cardiometabolic health of overweight/obese women with PCOS. It can be because of the impact of physical activity on relaxation, stress reduction, and positive hormone balance.

Limitation of Study

The small sample size is the only limitation of this study.

Strength of the Study

The effect of both yoga and aerobic exercises will be seen in this study and the protocol of both exercises is the strength of this study.

Conclusion

The conclusion of this study will provide insight to provide rehabilitation measures that will be easy to use and will provide musculoskeletal fitness, and hormonal balance, improve quality of life, and reduce fatigue in patients with polycystic ovary disorder.

Author Statements

Ethical Clearance

Informed consent will be obtained from all participants before recruitment for the study. The ethical clearance was taken from the institutional biomedical research ethical committee of Pandit Bhagwat Dayal Sharma University of Health Sciences, Rohtak concerning the letter No. BREC/23/TH-PHYSIOTHERAPY/10.

Conflict of Interest

The author declares no conflict of interest.

References

1. Witchel F, Oberfield E, Peña S. Polycystic ovary syndrome: pathophysiology, presentation, and treatment with emphasis on adolescent girls. *Jrnl Endocrn Socty.* 2019; 3: 1545-73.
2. Neven C, Laven J, Teede J, Boyle JA. A summary on polycystic ovary syndrome: diagnostic criteria, prevalence, clinical manifestations, and management according to the latest international guidelines. *Semin Reprod Med.* 2018; 36: 5-12.
3. Ribeiro VB, Lopes IP, Dos Reis RM, Silva RC, Mendes MC, Melo AS, et al. Continuous versus intermittent aerobic exercise in the improvement of quality of life for women with polycystic ovary syndrome: A randomized controlled trial. *J. Health Psychol.* 2021; 26: 1307-17.

4. Balen AH. Polycystic ovary syndrome (PCOS), *Obstet, Gynecol.* 2017; 19: 119-29.
5. Ramos FK, Lara LA, Kogure GS, Silva RC, Ferriani RA, Silva de Sá MF, et al. Quality of life in women with polycystic ovary syndrome after a program of resistance exercise training. *Rev Bras Ginecol Obstet.* 2016; 38: 340-7.
6. Kirthika SV, Paul J, Selvam PS, Priya VS. Effect of aerobic exercise and life style intervention among young women with polycystic ovary syndrome. *Res J Pharm Technol.* 2019; 12: 4269-73.
7. Costa EC, Sá JC, Stepto NK, Costa IB, Farias Junior LF, Moreira SD, et al. Aerobic training improves quality of life in women with polycystic ovary syndrome. *Am J Sports Med.* 2018; 1357-66.
8. Nidhi R, Padmalatha V, Nagarathna R, Amritanshu R. Effects of a holistic yoga program on endocrine parameters in adolescents with polycystic ovarian syndrome: a randomized controlled trial. *J Altern Complement Med.* 2013; 19: 153-60.
9. Mohseni M, Eghbali M, Bahrami H, Dastaran F, Amini L. Yoga effects on anthropometric indices and polycystic ovary syndrome symptoms in women undergoing infertility treatment: a randomized controlled clinical trial. *Evid. Based Complementary Altern. Med.* 2021; 2021: 5564824.
10. Gulati P, Gupta D, Kushwaha S, Sen S. Effects of aerobic exercise training on cardiovascular and musculoskeletal fitness in postmenopausal women. *Glob j res anal.* 2020; 9: 62-4.
11. Boivin M, Fatehi F, Phillips-Chan A, Richardson J, Summers A, Foley S. Exploratory study of a screening measure for polycystic ovarian syndrome, quality of life assessment, and neuropsychological evaluation. *BMC Women's Health.* 2020; 20: 1-132.
12. Bunevicius A. Reliability and validity of the SF-36 Health Survey Questionnaire in patients with brain tumors: a cross-sectional study. *Health Qual. Life Outcomes.* 2017; 15: 92.
13. Dkhar I, Vahita S, Pegu B. Effects of aerobic exercise on dysmenorrhea among adolescent girls in selected colleges at Puducherry. *Int J Recent Sci Res.* 2022; 13: 1915-8.