International
Journal of Medical and Exercise Science
(Multidisciplinary, Peer Reviewed and Indexed Journal)

ORIGINAL ARTICLE

EFECTIVENESS OF STRUCTURED EXERCISE PROGRAMME ON YOUNG ADULT WOMEN WITH PCOS: ANALYTICAL STUDY

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ABSTRACT

Back ground of the Study: Polycystic ovary syndrome [PCOS] is one of the most common endocrine disorder affected 210 million women worldwide. In India 70% of women are affecting with PCOS. It also associated with increased waist circumference lifestyle modification including increased physical activity is the first-line approach in managing PCOS. Aim of the study is to evaluate the effectiveness of structured exercise program on the physical and emotional disturbance among young women with PCOS. **Methodology:** This was conducted on 30 young adult women diagnosed with PCOS recruited through purposive sampling. A structured exercise program consisting of Aerobic, Resisted exercise and CBT session were given to all the participants for duration of 5 weeks. Value of BMI and WHR (WAIST HIP RATIO) were collected before and after therapeutic intervention. Subject with overweight and obese category, BMI, WHR>0.85, Age 19-25 years, PCOS confirmation Rotterdam consensus criteria ,menstrual irregulation , low ovulation and anovulation , clinical and biochemicals symptoms, multiple primary follicles in ovary determine by ultrasonography. **Result:** Comparing mean values of Body Mass Index Score between Pre test 26.88 ± 5.50 and Post test 25.46 ± 3.44 within Group). On comparing mean values of Waist Hip Ratio Score between Pre test 0.971 ± .079 and Post test 0.818 ± .030 within Group with Structured Exercise Program. It show difference in between Pre test and Post test mean values with t value shows 10.32 at P ≤ 0.001. **Conclusion:** The study concludes that the aerobic with resisted exercise are more significantly effective in improving physical and mental wellbeing of young adults.

Keyword: Polycystic ovary syndrome, Aerobic exercise, Resisted exercise, BMI

Received on 20th July 2024; Revised on 18th August 2024; Accepted on 26th August 2024
DOI:10.36678/IJMAES.2024.V10I03.005

INTRODUCTION

Polycystic ovary syndrome [PCOS] is one the most common endocrine disorder affecting 5-10 % in UK .210 million women are affecting world wide .In India 70% of women affecting with PCOS .All the women in the reproductive age and associated with chronic anovulation, hyperandrogenism and insulin resistance. These patients also have elevated triglycerides, low density lipoprotein [LDL] cholesterol level and high density lipoprotein [HDL] cholesterol level. Women with PCOS may complain about variable clinical manifestations including oligomenorrhea hirsutism, acne and infertility. Approximately, 75% of these women suffer from infertility due to an ovulation[1].

According to the ROTTERDAM criteria, there are the three key diagnostic features of PCOS which includes anovulation, hyperandrogenism and polycystic ovaries. The patients must display two of the three phenotypes to be diagnosed as having PCOS patient with up to the 90% young adult women with PCOS experiencing some type of anovulation. The primary etiology of this complex disease remains a hen and egg mystery. The sympathetic nervous system may be an important etiological factor. PCOS is associated with peripheral and central factors that influence sympathetic nerve activity[2].

Endocrine characteristics of pcos are elevated serum concentration of androgens and luteinizing hormone [LH] and decreased concentration of sex hormone binding globulin [SHBG]. The anovulation is associated with disturbance in the feedback from the ovarian steroid hormones to the hypothalamus and pituitary, resulting in disturbance in the pulsatility of gonadotropin releasing hormone [GnRH] release. The high concentration of LH in PCOS and low concentration are associated with relative problem in PCOS. PCOS affect the women ovaries the reproductive organs that produce estrogen and progesterone which are the hormone that regulates menstrual cycle. The Symptoms will be increase acne, excess hair growth one the bod , Hirsutism and male pattern hair loss, oily skin, dandruff, skin discolorations, high colestrol level, elevated blood pressure [3].

The Diagnosis are up to 70% of women are been diagnosed. A regular bleeding pattern is usually attained by one and a half year after the menarche, if this period exceeds three years, PCOS must be suspected. The 3 broad reasons for PCOS, seek medical care are menstrual disturbance, infertility problems of appearance and low self esteem arising from obesity and excessive hair growth, metabolic derangements including abnormalities in lipid levels, glucose and hypertension. The Treatment will be in the PCOS are focused on the both normalizing short term signs of hyperandrogenism and anovulation and reducing metabolic complication[4].

Obesity in women with PCOS negatively affects all clinical features and 5 – 10% weight loss has shown promising results on reproductive, metabolic and psychological level. Incorporating a healthy diet, increasing physical activity and changing dysfunctional thought patterns in women with PCOS are key points in losing weight. Body weight is not static it varies throughout the life of women in response to their physical activity, environmental, nutritional, social, and psychological factors. Obesity is associated with many hormonal dynamics. Menstrual disorders are common among women with

obesity. It includes dysfunctional uterine bleeding and PCOS. Exercises are recommended as the first-line of treatment for oligomenorrhea, Hirsutism, infertility and obesity in PCOS by the majority of endocrinologists and gynecologists[5].

An aerobic exercise is planned structured physical activity designed to improve or maintain physical fitness. Aerobic exercises resulted in a greater reduction in fasting insulin and insulin resistance. Exercise-induced changes in visceral fat are noted down in one recent study using single-slice computed tomography which measured changes in visceral fat with exercise training in PCOS. A resisted exercise is any form of active exercise in which dynamic or static muscle contraction is resisted by an outside force applied manually or mechanically. Resisted exercises are used to enhance muscle performance, improve or maintain muscle strength of connective tissue, tendon, ligaments and they contributed to greater bone mineral density. They also bring about positive changes in body composition; increases lean muscle mass and enhance feeling of physical wellbeing [6].

The three broad reasons that PCOS patients seek medical care are menstrual cycle disturbances, infertility problems of appearance and low self esteem arising from obesity and excessive hair growth, metabolic derangements, including abnormalities in lipid levels, glucose and hypertension. Treatment of PCOS is focused on both normalizing short term signs of hyperandrogenism and anovulation and reducing metabolic complications. The psycho social impact of obesity may be larger than the physiological risks. Obesity and sedentary lifestyle are escalating national and global epidemics that warrant increased attention by physicians and other health care professionals. These intricately linked conditions are responsible for an enormous burden of chronic disease, impaired physical function and quality of life, at least 300 000 premature deaths, and at least $90 billion in direct health care costs annually in the United States alone [7].

Although the prevalence of obesity is similar between the both sexes, women undergoing ovarian hormone decline experience symptoms and metabolic changes that can significantly affect the risk of developing obesity. It is suggested that the increased use of information and communication technology, particularly watching television, playing digital games and using computers are critical sedentary factors affecting obesity prevalence. In this regard, several cross-sectional studies carried out on children and adults suggested a strong relationship between high amounts of hours of television viewing and increased obesity[8].

However, most studies in this meta-analysis had a cross-sectional design and did not control for confounding factors; therefore they are unable to prove a relationship of cause and effect. Recent findings from a birth cohort reinforce the fact that watching television in childhood is associated with an increased BMI, adding evidence for an association of cause and effect between television viewing and overweight[9].

METHODOLOGY

The study is designed as an analytical pre-and-post type study conducted at the ACS Medical College and Hospital campus, involving a sample of 30 female college students aged 18 to 25 years, categorized as overweight or

obese based on BMI and with a waist-to-hip ratio (WHR) greater than 0.85. Participants must meet the Rotterdam consensus criteria for PCOS, exhibiting menstrual irregularities, low ovulation or anovulation, clinical and biochemical symptoms of hyperandrogenism, and multiple primary follicles in the ovaries as determined by ultrasound. Exclusion criteria include pregnancy, adrenal disease, history of fertility treatment or oral contraceptives, cardiovascular, liver, kidney, or respiratory issues, diabetes mellitus, uncontrolled hypertension, thyroid abnormalities, neurological or musculoskeletal complications, and non-cooperation. The study will be conducted for one hour per day, five days a week, over duration of three months. Measurement tools will include BMI and WHR, with outcome measures focusing on reductions in BMI and WHR, as well as improvements in menstrual regularity.

Procedure: This study was conducted on 30 adolescents confirmed with PCOS. They were selected based on the selection criteria and the purpose and nature of the study were explained to all participants and informed consent was obtained. Body mass index [BMI] and waist hip ratio [WHR] values were measured before and after the therapeutic intervention for all participants.

Aerobic Exercise: Walking: All the 30 subjects enrolled into the study were advised to perform brisk walking with moderate intensity for a minimum of 30 minutes. They were instructed to perform it at a comfortable speed, for 3 days a week for duration of 5 weeks.

Resisted Exercises: A resisted exercise is any form of active exercise in which dynamic or static muscle contraction is resisted by an outside force applied manually or mechanically. The subjects were instructed to perform the following specific resisted exercises using a low resistance theraband.

Knee extension exercise: Position of the subject: Sitting in chair, comfortably the subjects were instructed to assume a comfortable sitting position with their hip and knee flexed to 90. One end of the theraband was tied to the ankle joint, while the other end was tied to the chair. Now the subjects were asked to raise their leg from ground by opposing the resistance up to end range. The subjects performed this for 15 repetitions, 3 sets with 1-minute rest interval between each set. The exercise was performed in the other limb subsequently.

Hip abduction exercise: Position of the subject: Standing, the subjects were instructed to assume comfortable standing position parallel to the table to which one end of the theraband was tied, while the other end was tied to lower limb of the subjects. They were instructed to move their hip away from their body. The subjects performed this for 15 repetitions, 3 sets and 1-minute rest interval between each set. The exercise was repeated in other the limb subsequently.

Hip adduction exercise: Position of the subject: Standing the subjects were instructed to assume comfortable standing position parallel to a table to which one end of the theraband was tied. While the other end was tied to lower limb of the subjects near the ankle joint. The subjects were instructed to move their hip towards their body. The exercise was repeated in the other limb subsequently.

Hip flexion exercise: Position of the subject: Standing, the subjects were instructed to assume comfortable standing position in front of the table or side lying to which one end of the theraband was tied, while the other end was tied to lower limb of the subjects near the ankle joint. The subjects were instructed to bend their knee and move their hip upward against resistance. The subjects performed this for 15 repetitions, 3 sets with 1-minute rest interval between each set. The exercises were repeated in the other limb subsequently.

Hip extension exercise: Position of the subject: Standing; the subjects were instructed to assume comfortable standing position in front of the table to which one end of the theraband was tied, while the other end was tied to the lower limb of subjects near the ankle joint. The subjects were instructed to move their legs backward with knee straight against resistance. The subjects performed this exercise for 15 repetitions, 3 sets with 1-minute rest interval between each set. The exercises were repeated in the other limb subsequently.

Back extension exercise: Position of the subject: Prone lying on the floor, the subjects were instructed to assume prone lying position facing the floor. Their lower limbs were extended and arms placed at their side, palm facing forward with head and neck neutral. The upper body (chest and shoulders) was lifted off the ground, “crouching” towards the hip, and then upper body was slowly lowered down with control. There should be no movement from hip to the toes. If there was any discomfort in their lower back, the distance between their legs were widened and the height of the lift was decreased. Here, gravity acts as a resistance. The subjects performed this for 15 repetitions, 3 sets with 1-minute rest interval between each set.

Curl ups: Position of the subjects: Supine lying on the floor. The subjects were instructed to assume supine lying position on the floor by facing upward with their knees bent and the balls of feet and heels placed flat on the ground. Their hands were placed on opposing shoulder, so that arms were crossed over the chest, or behind the head. The abdominal muscles were tightened by drawing in the belly bottom to the spine. The heels and toes were kept flat and the head was lifted first, followed by the shoulder blades. Gravity acts as a resistance in this exercise. The subjects performed this for 15 repetitions, 3 sets with 1-minute rest interval between each set.

Biceps curl: Position of the subjects: Standing; the subjects were instructed to assume standing position parallel to the table, to which one end of the theraband was tied, while the other end was rolled around any one hand. They were instructed to bend their elbow against the resistance force of the theraband. The subjects performed this for 15 repetitions, 3 sets with 1-minute rest interval between each set. The exercises were repeated on the other limb subsequently.

Triceps extension: Position of the subjects: Standing; the subjects were instructed to assume standing position parallel to the table to which one end of the theraband was tied, while the other end was rolled around anyone hand. The elbow was straightened against the resistance force of the theraband. The subjects performed this for 15 repetitions, 3 sets with 1-minute rest interval between each set. The exercise was repeated on the other limb subsequently.

Shoulder abduction: Position of the subjects: Standing; the subjects was instructed to assume comfortable standing position. The distal ends of the theraband was held by both hands, while the middle part was fixed with their feet, they were instructed to raise both their arms sideways against the resistance force of the theraband. The subjects performed this for 15 repetitions, 3 sets with 1-minute rest interval between each set. The exercise was repeated on the other limb subsequently.

Shoulder adduction: Position of the subjects was standing; the subjects were instructed to assume standing position, aside the table to which one end of the theraband was tied and the other end was rolled around any one hand of the subject. They were instructed to move their shoulders towards the body against the resistance force of the theraband. The subjects performed this for 15 repetitions, 3 sets with 1-minute rest interval between each set. The exercise was repeated on the other limb subsequently.

Cognitive Behavioral Therapy

The subjects received 1 session of CBT in a week for 45 minutes, for a total duration of 5 weeks.

CBT focuses on: Cognitive restructuring, Modifying behavior, developing alternative scoping skills, Eliminating negative automatic thoughts and dysfunctional attitudes & depression

Session of CBT Techniques

Session-1

Breathing exercises: The subjects were encouraged to perform deep breathing exercise, which included apical breathing and lateral costal breathing exercise. It was performed in a relaxed manner for 10-15 minutes.

Apical breathing: The subjects sat in a comfortable sitting position with shoulders in a relaxed position. Now the patients were asked to close their eyes and hands placed over the upper part of the chest little above the clavicle bone. Then, subjects were encouraged to concentrate on breathing. While doing this, their hands lightly moved in upward direction and slowly inhale through mouth (pursed lip). They repeated it for 5 to 10 times with a ratio of 4:8 then the ratio was gradually progressed.

Lateral costal breathing: The subjects sat in comfortable sitting position. They were asked to close their eyes and hands were placed over the lateral aspect of the chest. Then subjects were encouraged to concentrate on breathing. While doing this, their hands slightly moved in outward direction and then slowly inhaled through their mouth. They repeated this for 5 to 10 times with a ratio of 4:8, and then the ratio was gradually progressed.

Session-2

Meditation: A few words describing the meditation procedure were told to the subjects before starting the first session.

Attention to position: Environment should be quiet and warm. The subject sat straight back, cross legged on a cushion on the floor, with their hands rested on thighs, fingers gently curled, head held in a relaxed position directly above the spinal column to release the neck muscles from strain while their eyes were closed.

Winding down procedure: The subjects were asked to assume a position in comfortable supine lying. Each subject was asked to check all their muscle groups to make sure they are relaxed as much as possible.

The instructions were given as below: Starting with feet, notice any tension, then move up to ankles, shifting them slightly if they are not relaxed, now legs, hips, settle them into the floor. Continue up through the body to shoulders, letting them drop down. Allow your arms to fall comfortably, with your fingers free of tension and head relaxed. Let tongue rest in your mouth.

Concentration on chosen stimulus: The instructions were given as below: Subjects were asked to assume supine lying position and to be aware of the ground beneath them. Feel it taking the weight of the body which touches the ground. Concentrate on sensation are getting from these contact points and feel safely to the ground.

Return to every day activity: The instructions were given as below: This is the termination of the meditation procedure. When are ready, let the meditation come to an end. If the meditation comes to an end, slowly move gaze from the point of focus. Try slowly moving the body round in small circles before get up. A few gentle stretches will also relax all the muscles.

Session-3

Progressive relaxation training

Progressive muscle relaxation helps the subjects to relax the tension in their muscles associated with stress. They develop awareness of their muscle tension and differentiate between feelings of tension and relaxation.

The instructions were given as below: The subjects assume supine lying position and lie down comfortably. They began the session by closing their eyes and clearing their mind, focusing on each part of the body, creating and releasing the tension from head to toe. Tense each muscle group for 5 to 10 seconds before tensing the next group of muscle. Each muscle group may be tensed two or three times until relaxed.

Face: The subjects lying in a comfortable position were asked to raise their eyebrows, wrinkle into a deep fawn, close jaw firmly and open mouth wide.

Neck: The subjects pressed their head back into the pillow.

Arms: The subjects were asked to raise their shoulders towards ear (shrug shoulders) brace shoulders back, bend forearm (extend elbows), bend their hands back (extend wrists), bend hands forward (flexion of wrist) and tighten by making fist (clench their hands).

Buttock: The subjects pressed their buttocks together tightly.

Legs: The subjects pressed their thighs down (extend hips), bend foot facing away from the body(plantar flexion of foot), bend foot facing towards the body (dorsiflexion of foot), bend toes facing away from body (flexion of toes) and bend toes facing towards the body (extend toes).

Data Analysis: The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for

TEST	PRE TEST		POST TEST		t - Test	Significance
	MEAN	S.D	MEAN	S.D		
GROUP	0.971	.079	0.818	.030	10.32	0.000***

social science (SPSS) version 24, with a significance level of p value less than 0.05 and a 95% confidence interval set for all analysis. The Shapiro Wilk test was used to determine the normality of the data. In this study, Shapiro Wilk test showed that the data was normally distributed on the dependent values at P > 0.05. Hence parametric test was adopted. Paired t-test was adopted to find the statistical difference within the groups.

TEST	PRE TEST		POST TEST		t - Test	Significance
	MEAN	S.D	MEAN	S.D		
GROUP	26.88	5.50	25.46	3.44	2.97	0.000***

Table – 1 Comparison of body mass index score within group between pre test and post test. (**- P ≤ 0.05 - Significant)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group. There is a statistically significant difference between the pre test and post test values within Group at P ≤ 0.05.

test 25.46 ± 3.44 within Group (Structured Exercise Program), it shows there is a highly significant difference in between Pre test and Post test mean values with t value shows 2.97 at P ≤ 0.001. The Post test values have shown improvement when compared with the pre test. Hence, the null hypothesis is rejected.

Table 2. Comparison of waist hip ratio score within group between pre test and post test (***- P ≤ 0.001 - Significant)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group.

There is a statistically significant difference between the pre test and post test values within Group at P ≤ 0.05.

On comparing mean values of Waist Hip Ratio Score between Pre test 0.971 ± .079 and Post test 0.818 ± .030 within Group (Structured Exercise Program), it shows there is a highly significant difference in between Pre test and Post test mean values with t value shows 10.32 at P ≤ 0.001. The Post test values have shown

RESULTS

On comparing mean values of Body Mass Index Score between Pre test 26.88 ± 5.50 and Post

improvement when compared with the pre test. Hence, the null hypothesis is rejected.

DISCUSSION

This study was conducted to analyse the effect of aerobic, resisted exercises and CBT on physical and emotional disturbances among adolescents with PCOS. PCOS is one of the common endocrine disorders affecting30-40% of all the women in the reproductive age and is associated with chronic anovulation, hyperandrogenism, insulin resistance and also with an increased prevalence of a number of metabolic risk factors including obesity, abdominal obesity, insulin resistance and compensatory cardiovascular diseases.

PCOS also promotes psychological morbidity including depression, poor body image and self-esteem and reduced health-related quality of life. PCOS and psychological difficulties are interrelated with each other. Some researcher believes the psychological difficulties as the cause of PCOS. Many previous studies revealed differences in the scores for anxiety and depression [12].

Several studies have examined the health effects of exercise as part of general lifestyle modification programs; however, few studies have investigated the specific effect of exercise training in PCOS on reproductive outcomes. Clark A.M. Regular exercise in women with PCOS has benefits on weight loss with improved management of metabolic and reproductive derangements. In the several studies they proved that incremental cycling exercise can alter the cardio respiratory response to exercise in PCOS shows the less result than resisted exercise [13, 14].

Regular exercise in women with PCOS has benefit on weight loss with improved management of metabolic and reproductive derangement. Exercise is the most preferred and effective method of treatment for PCOS in lifestyle modification Afsaneh Khademi et al. Volkan Turan et al reported that the exercise training had positive effect on maximal oxygen consumption, weight and waist circumference in PCOS patient. Polamba et al reported that dieting or aerobic exercise improved menstrual cyclicity and ovulation in overweight women with PCOS [15].

The investigators hypothesized that improved insulin sensitivity was the primary factor involved in ovarian function restoration; they reported that 49% of women with PCOS improved ovulation and menstrual cycles following treatment sessions of energy restricted diet alone or combined with aerobic exercise or aerobic resistance exercise. Overall, exercise studies have shown improvements in menstrual cyclicity and ovulation in 50% of PCOS women. Improvement in insulin and hormonal profile appear to play important role for improving reproductive function. This study has proved that 5 weeks of structured exercise program significantly improved physical and emotional outcomes and also regulated menstrual cycles in women with PCOS. Consistent with our findings, many studies have reported that exercise training has beneficial effects on metabolic syndrome parameters in overweight patients with PCOS [16,17].

An aerobic exercise is a planned structured physical activity designed to improve or maintain physical fitness. Resistance training is also effective for improving insulin sensitivity and body composition and can preserve lean

tissue during energy restricted weight loss. Combined aerobic and resistance exercise has been reported to be more efficacious for improving insulin sensitivity and glycaemia control and reducing abdominal fat in various obese groups compared with either form of exercise alone [18,19].

Ethical Clearance: Ethical clearance has obtained from Faculty of Physiotherapy, Dr. MGR. Educational and Research Institute, Chennai, Tamil Nadu, Reference number: No: 34/C / PHYSIO/ IRB/ 2020-2024, Dated: 23/12/2023.

Conflict of interest: There was no conflict of interest to conduct this study.

Fund for the study: It was a self-financed study.

CONCLUSION

Aerobic and resisted exercise programme along with cognitive behavioral therapy can be used as an effective non-pharmacological method to help PCOS adolescent's women to overcome their stress and depression levels in addition to reducing their Body Mass Index and Waist Hip Ratio in short term.

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S.M. Divya Mary, R.V. Janani (2024) Effectiveness of Structured Exercise Programme on Young Adult Women with PCOS: Analytical study, ijmaes; 10(3); 1907-1917.