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"TO STUDY THE EFFECTIVENESS OF PHYSICAL ACTIVITIES TO REDUCE WEIGHT AMONG POLYCYSTIC OVARIAN SYNDROME PATIENTS"

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ABSTRACT
BACKGROUND OF THE STUDY:
The complicated condition known as polycystic ovarian syndrome is caused by a combination of hereditary and environmental factors that impair menstrual cycle coordination.
AIM OF THE STUDY:
The aim of the study was to determine the effects of physical activities for weight reduction among women with PCOS.
METHODOLOGY:
Thirty women diagnosed with PCOS were chosen for the study of age group between 18 to 30 years according to selection criteria. They were conveniently allocated into two equal groups. Group 1 (Experimental group) 15 were given with aerobic exercises along with anaerobic exercises. Group 2 (Control group) 15 were given with simple walking. Both the groups were measured with pre and post exercises for heart rate, blood pressure, body mass index, body circumference using pulse oximeter, sphygmomanometer and anthropometric measurements.
RESULTS:
The subjects who were supervised to attend all the sessions were shown a difference in their BMI of average 1.59 kgm^{-2} and reduction in their body fat percentage of average 3.6 %.
CONCLUSION:
Physical activities (combined aerobic and anaerobic exercise training) are effective in weight reduction for women with polycystic ovarian syndrome.
KEYWORDS: PCOS, Overweight, Obesity, fat mass, workout, Weight loss.

INTRODUCTION

Between 1990 and 2019, the number of women in the reproductive age ranges (15–49 years old) who experienced PCOS-related infertility doubled globally, from 6.00 million in 1990 to 12.13 million in 2019. PCOS is currently prevalent in young women. PCOS, or polycystic ovarian syndrome, is a complex and multigenic illness. The first description of PCOS was provided by Stein and Leventhal in 1935. [1] People in the modern generation don't take the time to take care of their physical well-being. Sedentary lifestyles and increased food adulteration have an impact on all systemic regulations. Type 2 diabetes mellitus, infertility, cardio metabolic issues, and other issues are the results. Physical symptoms associated with PCOS in women include hirsutism (excessive body hair growth), acne, infertility, obesity, insulin resistance, and dyslipidemia, in variable degrees. Compared to women with PCOS and a healthy BMI, those with PCOS with a BMI above 30 kg/m2 have significantly greater incidence of depression. Physical activity has a significant impact on PCOS. According to PCOS clinical trials, high-intensity interval training (HIIT) or aerobic training (walking, cycling, etc.) administered for 12–24 weeks can markedly improve key clinical outcomes such as body fat percentage, insulin sensitivity, total and LDL cholesterol, and C-reactive protein (CRP). According to clinical practice standards, women with PCOS should perform aerobic exercise for at least 90 minutes per week [9]. The most effective type of exercise for skeletal muscle is anaerobic activity, such as progressive resistance training (PRT). Notably, research has repeatedly demonstrated that PRT helps combat metabolic illnesses, such as insulin resistance [23]. There is currently no ideal pharmacological intervention in PCOS and for this reason lifestyle modification, including weight loss, remains first-line management to improve cardiovascular risk factors and reproductive dysfunction. Aerobic exercise involves repeated movements of large muscle in arms, leg and hips. Breathing is faster and deeper which maximizes the amount of oxygen in the blood in turn increases the blood flow to the muscles and remove the end-products of metabolism such as carbon dioxide and lactic acid and to dissipate excess heat. The shift in body metabolism occurs through coordinated activity of all the systems of the body [4]. The capacity to perform all-out exercise for up to 60 seconds largely depends on ATP generated by the immediate and short-term anaerobic systems for energy transfer. [4] The intramuscular high-energy phosphates supply energy for intense but brief exercise, so little lactate accumulates, and recovery progresses rapidly. Thus,

exercise can begin again, after about a 30-second rest. As the duration of maximal effort extends beyond 10 seconds, dependence on anaerobic energy from the intramuscular high-energy phosphates decreases, with a proportionate increase in anaerobic energy transfer from anaerobic glycolysis. Repetition of exercise causes "lactate stacking," which results in a higher blood lactate level than with just one bout of exhaustive effort. As with all training regimens, one must exercise the specific muscle group that require enhanced lactate-producing capacity. [4]

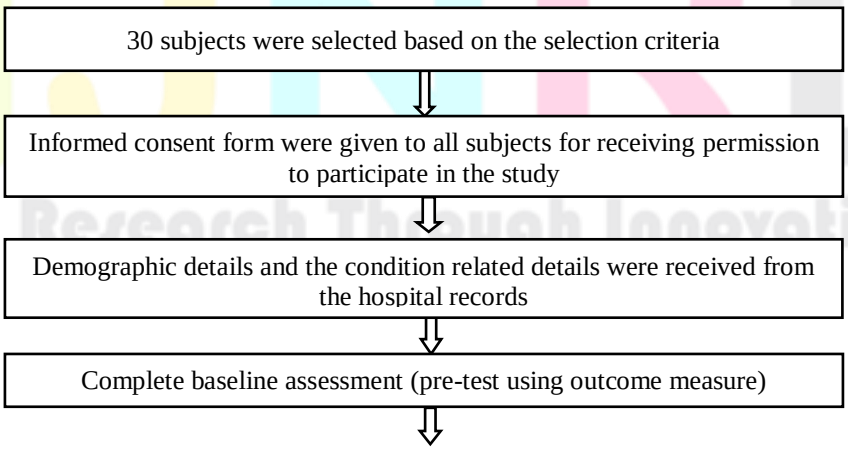
American College Of Sports Medicine recommends physical activity for overweight and obese adults. They may benefit from progression to approximately 250–300 min per week or 50 to 60 min on 5 days per week as this magnitude of physical activity appears to enhance long-term weight-loss maintenance. [5] The duration of moderate- to vigorous-intensity physical activity should initially progress to at least 30 minutes per day and when appropriate progress to 50–60 minutes per day or more to enhance long-term weight control and maintenance of physical activity. The addition of resistance exercise may enhance muscular strength and physical function in people with overweight and obesity. Moreover, there may be additional health benefits of participating in resistance exercise in this population. [5] Target a minimal reduction in body weight of at least 5% to 10% of initial body weight over a 3- to 6-month period. [5]

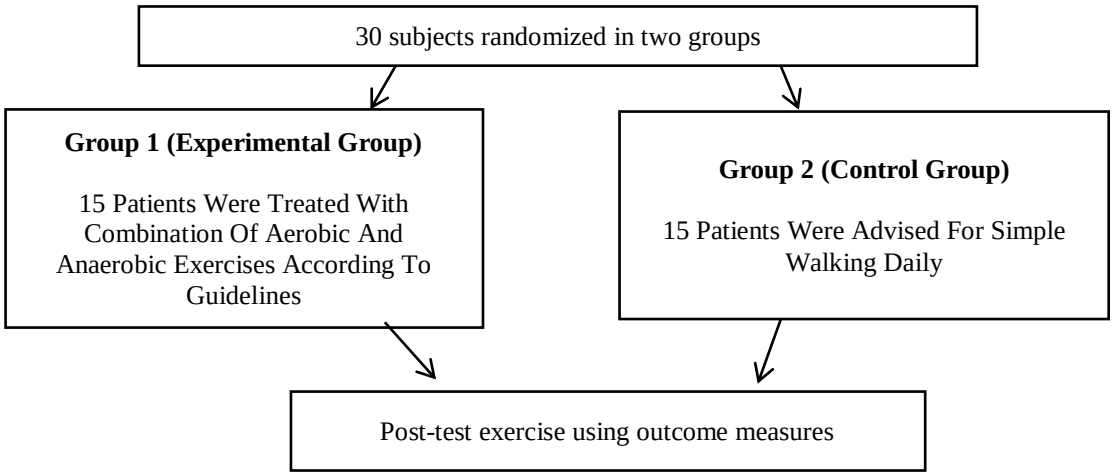
Obesity and PCOS are considered as a double head sword. Both progress as the impact of each other. To break the viscous connection, physical activities play the predominant role. Physical activity is also considered vital for maintaining mental fitness, and it can reduce stress. Physical activity produces endorphins (chemicals in the brain that act as natural painkillers and also improve the ability to sleep, which in turn reduces stress). Previous clinical trials proved the effects of aerobics and resisted separately to reduce weight for women with PCOS. This study aims to determine the effect of weight reduction for PCOS patients by combined aerobic and anaerobic training. Additionally, rather than linear walking, this study attempts the infinity walking which have been proved as a better outcome for weight loss.

RESEARCH METHODOLOGY

The experimental study recruited the participants from Department of obstetrics and gynecology, Melmaruvathur Adhiparasakthi institute of medical science and hospitals. Patients were selected according to the selection criteria, which included Women diagnosed with PCOS according to the Rotterdam criteria, BMI 24 and above, age 18 to 30 years, experienced menarche (their first menstrual bleeding), English and Tamil speaking, physically able to perform exercise, who accepted to follow the routine & exercise sessions regularly & signed the informed consent. The study excluded subjects with Post-menopausal status, undergone surgical treatment for PCOS, undertaking regular structured exercise defined as > 150 min/week , any medical condition that may be responsible for the symptoms of PCOS, such as congenital hyperplasia, androgen-secreting tumor, hyperprolactinemia, or Cushing's syndrome, have current clinically defined CVD or a history of cardiac events. Study included 30 participants according to the selection criteria. They were conveniently allocated equally into 2 groups. The experimental group was given with combined aerobic and anaerobic exercise. This group attended all the sessions of the exercise. The exercise session performed through 3 phases. Initially, the participants were monitored their heart rate and blood pressure. Starting with warm-up session for at least 5 to 10 minutes of low- (40% VO_2R) to moderate- (40% - <60% VO_2R) intensity cardiovascular and muscular endurance activities. Followed by conditioning exercises which was aerobics in the first few weeks and then progressed to anaerobic exercise. Conditioning phase last for 20 to 60 minutes, Completing the exercise session with cool down phase for at least 5 to 10 minutes of low- (<40% VO_2R) to moderate- (40% - <60% VO_2R) intensity cardiovascular and muscular endurance activities. At least 10 minutes of stretching exercises performed after the warm-up or cool-down phase. The total session duration is 45 to 60 minutes. The 15 participants of control group were advised to perform simple walking for 30 minutes. The study duration was 12 weeks. The outcomes for the study are body mass index and fat percentage. All the participants of both the groups were measured their BMI and fat percentage by anthropometric measurements and also the baseline data pre-test and post-test. BMI was calculated by dividing the weight (in kg) by height (in meter). Fat percentage was measured using the girth measurement [4].

PROCEDURE





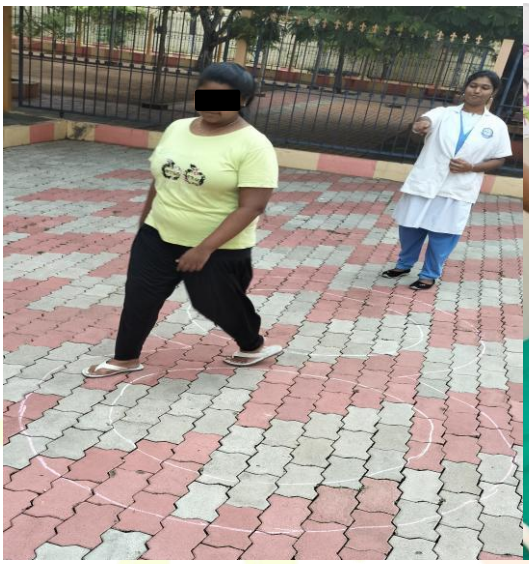


Fig1:FIGURE OF 8 WALK

Fig 2: JUMPING JACKS

Fig 3: KNEE PUSHUP

Fig 4: PLANK JACKS

Fig 5: FLUTTER KICKS

Fig 6: BURPEES

Table no. 1.1 **Group A BMI- Paired Samples Statistics**

Distribution of Body Mass Index Group-A (Experimental)		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	28.3907	15	4.12319	1.06460
	Posttest	26.7933	15	4.00579	1.03429

Table no. 1.2 **Group A BMI - Paired Samples Test**

Distribution of Body Mass Index Group-A (Experimental)	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair Pretest - Posttest	1.597	.92562	.23899	1.08474	2.10993	6.684	14	.000

Graph no. 1 BMI group-A

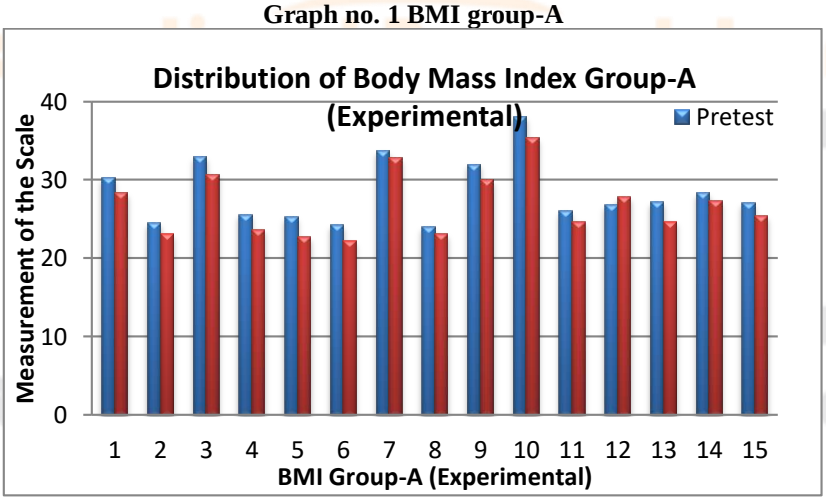


Table no. 2.1 **Group B BMI- Paired Samples Statistics**

Distribution of Body Mass Index Group-B (Control)		Mean	N	Std. Deviation	Std. Error Mean
Pair	Pretest	28.6373	15	3.21659	.83052
	Posttest	27.7867	15	3.27564	.84577

Table no. 2.2 **Group B BMI - Paired Samples Test**

Distribution of Body Mass Index Group-B (Control)	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair Pretest - Posttest	.8506	.42008	.10846	.61804	1.08330	7.843	14	.000

Graph no. 2 BMI group-B

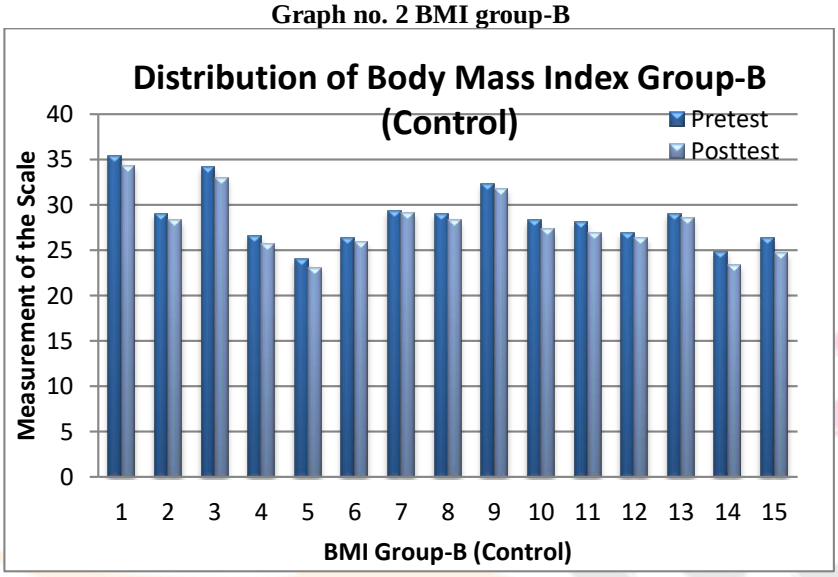


Table no. 3.1 **Group A FAT % - Paired Samples Statistics**

Distribution of FAT Percentage Group-A		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	38.9213	15	6.76460	1.74661
	Posttest	35.2327	15	6.61552	1.70812

Table no. 3.2 **Group B FAT % - Paired Samples Test**

Distribution of FAT Percentage Group-A	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair Pretest -Posttest	3.6886	1.95018	.50353	2.60870	4.76864	7.326	14	.000

Graph no.3 fat % group – A

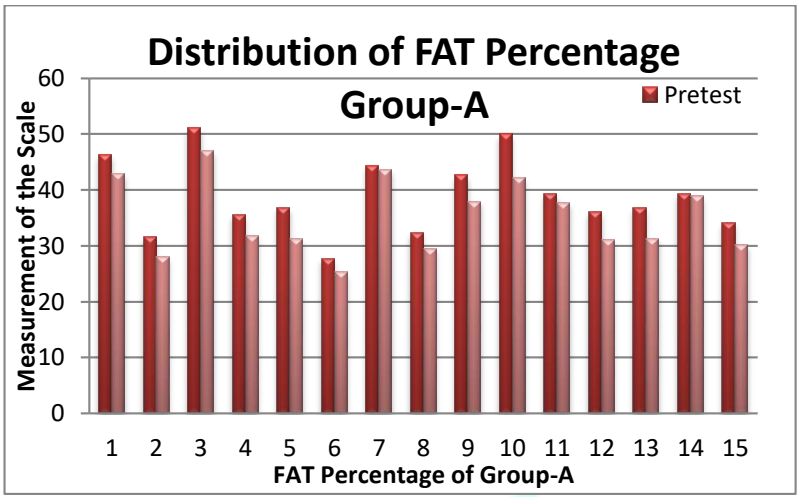


Table no. 4.1 **Group B FAT % - Paired Samples Statistics**

Paired Samples Statistics

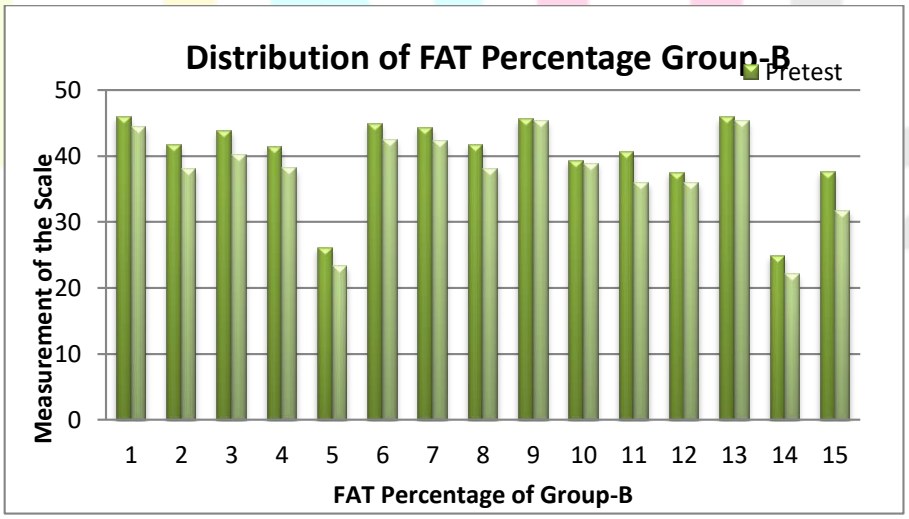
Distribution of FAT Percentage Group-B		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	40.0933	15	6.55024	1.69127
	Posttest	37.5107	15	7.10332	1.83407

Table no. 4.2 **Group B FAT % - Paired Samples Test**

Paired Samples Test

Distribution of FAT Percentage Group-B	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair Pretest - Posttest	2.58267	1.59406	.41159	1.69990	3.46543	6.275	14	.000

Graph no.4 fat % group – B



RESULTS

30 PCOS participants were included in this study to find out the effectiveness of physical activities in them. They were divided into 2 groups, group A (treated with combined aerobic and anaerobic exercises) and group B (advised for simple walking). For outcomes, BMI and fat percentage was used, showing the following results. The mean ± standard deviation of group A (experimental group) measuring BMI in pre-test was 28.3907 ± 4.12319, in post-test was 26.7933 ± 4.00579 and paired difference was 1.597 ± 0.92562.The mean ± standard deviation of group B (control group) measuring BMI in pre-test was 28.6373 ± 3.21659, in post-test was 27.7869 ± 3.27564 and paired difference was 0.8506 ± 0.42008. The mean ± standard deviation of group A (experimental group) measuring fat percentage in pre-test was 38.9213 ± 6.76460, in post-test was 35.2327 ±6.61552 and paired difference was 3.6886 ± 1.95018.The mean ± standard deviation of group B (control group) measuring fat percentage in pre-test was 40.0933 ± 6.55024, in post-test was 37.5107 ± 7.10332 and paired difference was 2.58267 ± 1.59406. The study showed that the combined aerobics and anaerobic exercises effectively reduced the weight and fat percentage of the participants with PCOS.

DISCUSSION

30 PCOS participants were included in this study to find out the effectiveness of physical activities in them. The purpose of this study was to analyze the effects of aerobic and anaerobic exercise to reduce weight among PCOS women. This study has done the exercise program for 12 weeks. 30 participants were divided into 2 groups of 15 participants. In group A, 3 subjects were nearly overweight (BMI 24 to 24.9), 7 subjects were overweight (BMI 25 to 29.9) and 5 subjects were obese (BMI 30 and above). In group B, 2 subjects were nearly overweight, 10 subjects were overweight and 3 subjects were obese. The mean ± standard deviation of age in group A is 20.86 ± 1.627 and group B is 23.8 ± 2.73. 1 subject was dropped out at 2nd week of the study due to severe menstrual flow after 6 months of amenorrhea.

This study had no restriction to the diet and medication of the participants. This study had proven only the effects of physical activities. The independent variables in this study were the aerobic and anaerobic exercises. The dependent variables in the study were anthropometric measurements i.e., Body mass index and fat percentage. The experimental group who were supervised to attend all the sessions was shown a difference in their BMI of average 1.59 kgm^{-2} and reduction in their body fat percentage of average 3.6%. The graphical data shows that there was significant difference in both the groups in dependent variables of BMI for weight and fat percentage for fat. But there was slighter more difference in group A.

Results from Exercise therapy in polycystic ovary syndrome: a systematic review by Cheryce L.Harrison et al, [12] suggest that improvements in outcomes assessed were not dependent on length of exercise intervention or the type and frequency of exercise performed as significant clinical benefits were observed in more sustainable, less intensive studies, of shorter duration. Regular, moderate-intensity aerobic exercise over a short period improves reproductive outcomes including ovulation and menstrual cycle regulation in addition to reducing weight and Insulin resistance in young, overweight women with PCOS.

LIMITATIONS AND RECOMMENDATIONS

Recommendations for the further study are to take a bigger sample size, to extend and monitor the long-term effects, to categorized into many groups such as with and without medication, with and without dietary approach, etc., to include many outcome measures, for example, insulin regulation, androgen level, estrogen level, hirsutism changes, ovulation changes for long period. Incorporation of this exercise program in conjunction with their medications and dietary modification can benefit the women with PCOS tremendous results.

CONCLUSION

From this study it was concluded that physical activities (combined aerobic and anaerobic exercise training) is effective in weight reduction for women with polycystic ovarian syndrome.

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