

RESEARCH ARTICLE

Effect of Aerobic exercise and life style intervention among young women with Polycystic Ovary Syndrome

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ABSTRACT:

INTRODUCTION: Poly cystic ovary syndrome (PCOS) is the common endocrine condition with an increasing prevalence in recent years. Life style is recognized to be a very important factor in the development and progression of this condition. Poor life style which includes lack of exercise and dietary habits is said to be the underlying factor in the development of the condition. It is estimated that approximately 40%-60% of PCOS subjects are obese. Obesity plays a major role in aggravating the clinical presentation of the disease, very importantly fertility and metabolism. Insulin resistance is also closely associated with obesity and PCOS. Lifestyle changes including more physical activity, changes in nutritional habits and diet can improve obesity, metabolic and hormonal profile in these people which enhances their quality of life. **OBJECTIVE:** To study the effectiveness of aerobic exercise and life style intervention among young women with polycystic ovary syndrome. **MATERIALS & METHODS:** Total 30 PCOS subjects in the age group between 18 to 25 years were recruited based on the Rotterdam criteria (2003) for the presence of PCOS in this pretest-posttest, randomized controlled trial. The recruited subjects were randomly allocated into two groups, each group consisting of 15 subjects. Group A (AE) were intervened with aerobic exercises protocol, which comprised of 45 minutes of brisk jogging in a treadmill at 6km/hour speed and Group B (ASE) were instructed only to do active stretching exercises. The study duration was 12 weeks. PCOS-Q50 and blood hormonal level were taken pre and post intervention. Both the groups received nutritional advice from a nutritionist. Statistical analysis of the result was done using paired t test within groups and independent t test between the groups. **RESULT:** The result of the study showed that on the PCOS Q-50 parameter, LH: FSH ratio, free testosterone hormone level, homeostatic Model Assessment Insulin resistance and high sensitivity C Reactive protein, Group A(AE) showed highly significant decrease in the post test mean at $P \leq 0.001$ when compared to Group B(ASE). **CONCLUSION:** The present study concluded that a 12 week aerobic exercise and life style intervention was effective in improving PCOS-Q50 scores and hormonal levels among young women with PCOS.

KEYWORDS: PCOS, Life style, women, Diet, Quality of life.

INTRODUCTION:

Polycystic ovary syndrome (PCOS) is a most common endocrine disorder of women in reproductive age and leading cause of infertility, affecting 6-20%⁽¹⁾ depending on the diagnostic criteria used. It is associated with multiple reproductive disorders, and features by polycystic ovaries, menstrual dysfunction, infertility and biochemical (elevated androgens) and clinical (hirsutism and/or acne) hyperandrogenism⁽²⁻³⁾. Further, it appears that physical inactivity, weight gain and genetic predisposition play important roles in the clinical

expression of PCOS⁽⁴⁾. PCOS is probably multifactorial and the hall mark feature being the hormonal imbalance, caused by elevated free testosterone and insulin resistance. This paves way for the development of long term complications such as type 2 diabetes mellitus, hypertension, cardio vascular disease, infertility, dyslipidemia, metabolic syndrome, psychological depression and anxiety which leads to a poor quality of life.

As the prevalence rate of PCOS is increasing there is a need to prevent this or identify disease at an early stage to prevent its long term metabolic complications. Various exercise and life style intervention are advocated in subjects with PCOS. Aerobic exercise if initiated at an early stage of the disease may have beneficial effects in subjects with PCOS. Aerobic exercise help to burn calories, aids in vital control, increases serum HDL cholesterol, reduces weight and may improve insulin resistance. This, in turn reduces the ovaries production of testosterone. With lower testosterone, ovulation and menstruation become more regular and insulin levels come down. In women with PCOS and obesity, weight loss through diet control has been shown to improve pregnancy rates, normalize hyperandrogenemia^(5,6), improve insulin sensitivity, menstrual function and hirsutism⁽⁷⁾. Weight loss via exercise or diet is considered one of the most important targets in lifestyle modification programs capable to induce an improvement in reproductive function among obese women with PCOS⁽⁸⁾. Weight reduction is recommended for overweight women with PCOS, especially reduction in abdominal and visceral fat⁽⁹⁾.

Previous studies have proved the effect of exercises and life style modification among subjects with PCOS. Yet there is a need for more RCTs to prove the effect of these interventions especially among young Indian women with PCOS. Hence the present study was an attempt to find the effects of aerobic exercises combined with life style intervention like diet control on the hormonal levels and quality of life improvement in young Indian women subjects with PCOS.

MATERIALS AND METHODS:

Recruitment:

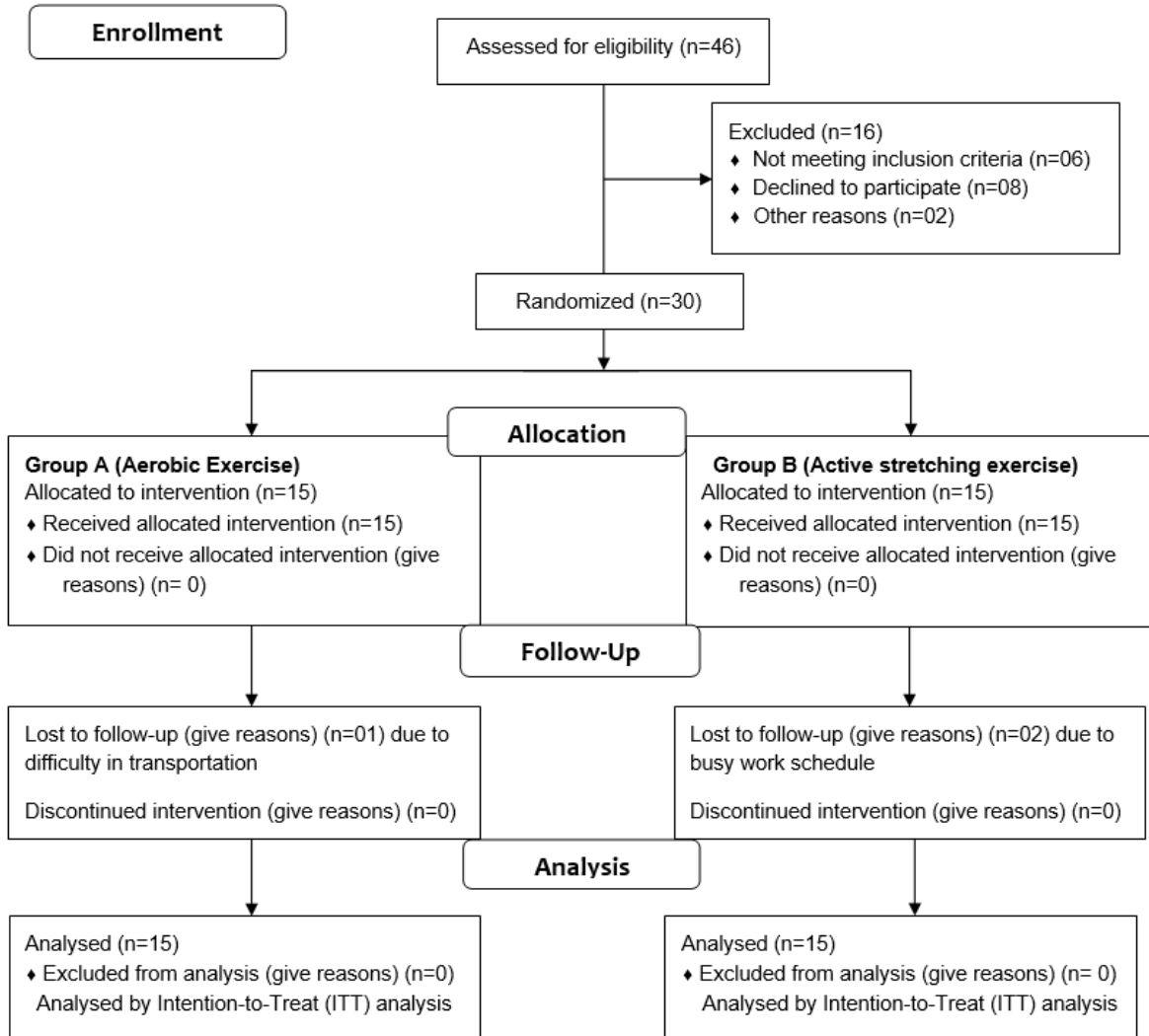
This was an experimental study, comparative pre-posttest type. The primary aim of the study was to find the effect of aerobic exercises and life style intervention among young Indian women with PCOS and the secondary aim was to compare these effects with conventional active stretching exercises. The university research and ethics committee (ACS/2018/67) approved the study protocol. A power analysis using nMaster 2.0 software indicated that an alpha of .05, a power of 0.80, an effect size of 0.8, and a sample size of 30 were needed. Hence 30 PCOS subjects in the age group

between, 18 to 25 years were recruited for this study through simple random sampling. The study was performed between Jan, 2018 and June, 2018 and done in accordance with ethical guidelines for biomedical research on human subjects, Indian Council for Medical Research (ICMR), 2006 and also in accordance with the guidelines of Helsinki declaration, revised 2013⁽¹⁰⁾. Subjects with Hyperprolactinemia, Thyroid dysfunction, Glucocorticoid dysfunction, Subjects under antihypersensitives and lipid lowering agents were excluded from the study. The recruited subjects were randomly allocated into two groups through block randomization. There were five blocks with a matrix design of 6×5, where 6 being rows. Each block contained 6 chits (3 chits for each group) totaling 30. The subjects were allotted to the groups based on the randomly chosen chit. Once a block was allotted, next row block was opened. Thus equal number of subjects was assigned to each group over time. Group A (Experimental group) were intervened with aerobic exercises and Group B (conventional group) were instructed to do stretching exercises. The detailed purpose, procedure and benefits of the study was explained to them after obtaining signed consent form before data collection and assured confidentiality of the collected data.

Procedure:

The subjects in Group A were intervened with an aerobic exercise protocol, which comprised of 45 minutes of brisk jogging in a treadmill at 6km/hour speed. This included an initial 10 minutes of warm up and final 10 minutes of a cool down period during which the workload gradually decreased until HR (<140 beats/min) and blood pressure nearly to the resting levels. The subjects performed this for 3 days in a week × 12 weeks. The exercise protocol was followed in accordance with the international evidence based guideline for the assessment and management of polycystic ovary syndrome (2018). The subjects in Group B performed active stretching exercises for the upper limb, lower limb and trunk muscles. Each stretch was held for 20 seconds and 10 repetitions for each group of muscle daily for 12 weeks. The muscles concentrated were triceps, pectorals, abdominals, gluteals, quadriceps, hamstrings and calf muscles. Outcome measures recorded were the PCOSQ50 and blood levels of free testosterone, LH: FSH ratio, HOMA IR (Homeostasis model Assessment Insulin Resistance) and HsCRP (High sensitivity C reactive protein) at the beginning and end of treatment at 12 weeks. Dietary advice from a nutritionist was given for both the groups which consisted of a high protein low carbohydrate diet. The result obtained after 12 weeks were subjected to statistical analysis.

CONSORT 2010 Flow Diagram



DATA ANALYSIS:

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. Descriptive Paired t-

test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find the statistical difference between the groups.

Table 1 Comparison of pre test values of test variables between Group A and Group B
 #Group A –Aerobic Exercise, # Group B – Active Stretching Exercise

TESTVARIABLES	PRETEST		t test	df	P value
	GROUP A Mean ±SD	GROUP B Mean ±SD			
PCOSQ50	133.20±3.94	132.53±2.87	1.84	28	0.601*
LH:FSH	2.94±0.703	2.81±0.676	0.529	28	0.601*
FREE TESTOSTERONE	4.69±0.229	4.72±0.342	-0.332	28	0.743*
HOMA IR	3.88±0.257	3.95±0.321	-0.583	28	0.565*
HSCRIP	4.17±0.404	3.96±0.261	1.69	28	0.101*

**Table 2 Comparison of post test values of test variables between Group A and Group B
#Group A –Aerobic Exercise, # Group B – Active Stretching Exercise**

TEST VARIABLES	PRETEST		t test	df	P value
	GROUP A Mean ±SD	GROUP B Mean ±SD			
PCOSQ50	83.13±2.41	100.53±2.64	-18.82	28	0.000***
LH:FSH	1.54±0.639	2.21±0.414	-3.38	28	0.000***
FREE TESTOSTERONE	2.60±1.57	4.10±0.303	-16.96	28	0.000***
HOMA IR	2.79±0.255	3.64±0.310	-8.21	28	0.000***
HSCR P	2.77±0.373	3.25±0.249	-4.09	28	0.000***

Table 3 Comparisons of test variables within Group – A between pre and post test values

#GROUP - A	PRE TEST	POST TEST	t - TEST	SIGNIFICANCE
	MEAN±S.D	MEAN±S.D		
PCOS Q - 50	133.20±3.94	83.13±2.41	63.89	0.000***
LH:FSHRATIO	2.94±0.703	1.54±0.639	61.96	0.000***
FREETESTOSTERONE	4.69±0.229	2.60±1.57	10.69	0.000***
HOMEOSTATICMODEL ASSESSMENT INSULIN RESISTANCE	3.88±0.257	2.79±0.255	4.58	0.000***
HIGH SENSITIVITY C-REACTIVE PROTEIN	4.17±0.404	2.77±0.373	52.09	0.000***

Table 4 Comparisons of Test Variables Within Group – B Between Pre & Post Test Values

#GROUP - B	PRE TEST	POST TEST	t - TEST	SIGNIFICANCE
	MEAN±S.D	MEAN±S.D		
PCOS Q - 50	132.53±2.87	100.53±2.64	11.39	0.000***
LH:FSHRATIO	2.81±0.676	2.21±0.414	20.90	0.000***
FREETESTOSTERONE	4.72±0.342	4.10±0.303	44.30	0.000***
HOMEOSTATICMODEL ASSESSMENT INSULIN RESISTANCE	3.95±0.321	3.64±0.310	27.04	0.000***
HIGH SENSITIVITY C-REACTIVE PROTEIN	3.96±0.261	3.25±0.249	19.37	0.000***

RESULT:

The result of the present study showed the effect of Group A (aerobic exercises) and Group B (Active stretching exercises). The mean pre test values of the test variables are shown in Table/Fig-1. There was no statistically significant difference in the pre test mean values between Group A and Group B at $P \geq 0.05$. The mean post test values of the test variables are shown in Table /Fig-2. There was a statistically highly significant difference in the post test mean values between Group A and Group B at $P \leq 0.001$. Within group analysis in both the groups showed statistically highly significant difference in Group A and Group B as shown in Table/Fig-3 and Table/Fig-4. The statistical analysis revealed the fact that both the groups had significant improvement in the post test mean values but when the groups were compared, Group A (Aerobic Exercises) was more effective than Group B (Active stretching exercises).

DISCUSSION:

The present study demonstrated that a moderate aerobic exercise program resulted in a substantial reduction in insulin resistance (HOMA IR) among young women with PCOS. Exercise induced improvements of whole body insulin sensitivity have previously been demonstrated in girls^(11,12). This study also supports the fact that aerobic exercise initiated early in PCOS has shown to reduce free testosterone levels, increased LH: FSH ratio and HSCR P an indicator of risk of cardiac disease. Also the quality of life measurements in young girls with PCOS have shown improvement. The present

study strengthens the recommendation for adopting regular physical activity in the treatment of metabolic function in women with PCOS. Importantly regular exercise in women with PCOS has benefits in weight loss with improved management of the metabolic derangements.

Previous studies have shown significant body composition and IR changes with similar exercise intervention⁽¹³⁾. In a non-randomized study, Vigorito et al.⁽¹⁴⁾ found that a three months structured aerobic exercise program improve BMI in overweight women with PCOS, compared to a non- aerobic exercise PCOS group. The combination of exercise and dieting has been extensively reported to substantially increase weight loss compared with dieting or exercise alone.⁽¹⁵⁾ This study also supports the fact that aerobic exercise training improves body composition and a number of CVD risk markers independent of weight loss in overweight and obese individuals^(16, 17)

Lifestyle modification (LSM) programs, comprising diet and/or physical activity, are recommended for high-risk patients (prediabetic) to delay the onset of adult type 2 diabetes^(18,19), one of the most serious complication of PCOS.

Studies on lifestyle behaviors showed that the increase in physical activity and a reduction in caloric intake significantly improve ovulatory function, circulating androgen levels, inflammatory pattern and insulin sensitivity in women with PCOS^(20,21). In one study, 12 weeks of either diet only, diet plus aerobic exercise or diet plus ST and aerobic exercise was tried compared

with diet alone and exercise in combination with diet provided more favorable effects on fat mass and fat-free mass⁽²²⁾. Thus, lifestyle modifications that combine energy restriction for weight loss and regular exercise would appear to be a preferred treatment strategy in overweight women with PCOS⁽²³⁾. The present study emphasizes the fact that early exercise intervention has shown to reduce the long term metabolic complications of the disease.

LIMITATIONS OF THE STUDY:

This study has few limitations. Small sample size, inclusion criteria was not based on the BMI of the subjects and there was no long term follow up to see the effects of exercise.

CONCLUSION:

The present study concluded that 12 weeks of aerobic exercise and stretching exercises with life style management had improvement on hormonal profile and quality of life improvement in subjects with PCOS. But aerobic exercises were more superior to stretching exercises on hormonal profiles and quality of life improvement among young women with PCOS.

CONFLICT OF INTEREST:

No potential conflicting interests declared by the authors

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Nil

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