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Research Article

Physiotherapy for Better Pain Management

Comparison of Short-Term Structured Exercise in Non-Over Weight and Overweight Subjects with Polycystic Ovarian Syndrome

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Abstract : Polycystic Ovarian Syndrome is one of the most common female endocrinological disorder which is a complex multifaceted heterogeneous disorder affecting approximately 5%-10% of respondents of reproductive age, endocrine and metabolic function. The patients with PCOS have elevated triglyceride and low-density lipoprotein (LPL) cholesterol levels and low high-density lipoprotein (HDL) cholesterol levels. Exercise combined Aerobic and Resistance exercise improves insulin sensitivity and glycaemic control, reduces abdominal fat in women and modified with diet is considered to be preferred as the first-line treatment for PCOS management with the primary goal to normalize serum androgen and to restore reproductive function. The aim of the study was to find the effect of comparison of short-term structured exercise in non-over weight and overweight subjects with Polycystic Ovarian Syndrome. This experimental study design with a total of 30 subjects were taken by simple random sampling method at Outpatient Physiotherapy Department, ACS Medial college and hospital, vellapanchavadi, chennai. The subjects included were those with secondary amenorrhoea, body hair growing on the chest, belly, face and around the nipples, decreased breast size irregular periods, male-like characteristics, enlargement of the clitoris, male-pattern baldness, acne, cysts on the ovaries, Overweight, skin tags, anxiety or depression, hoarseness of voice, dark or thick skin markings and creases around the armpits groin, neck and breasts, dandruff patches on skin on the neck, arm, breasts, thigh, pelvic pain, sleep apnea, age group with 18-25,unmarried women, BMI ranging between 18-25. The subjects excluded were those with diabetes, thyroid, adrenal or pituitary gland dysfunction obese women, undergoing medications, seizures, hypertension ,cardiac patients, psychological problems ,fracture ,Non co-operative patients, age group(<18 and >25),neurological problems ,low back ache, married women, pelvic inflammatory disease, urinary tract infection, recent abdominal surgery . The outcome measure is measured by (PCOSQ-50) questionnaire and BMI scale. Group-A consisted of Overweight subjects and Group-B consisted of Non-over weight subjects and both the groups received Aerobic and Resistance training along with dietary plans for 56 days with 3 sessions per week on consecutive days. The PCOSQ-50 questionnaire was used. Result On comparing the mean values of Group A and Group B among BMI and PCOSQ-50 Questionnaire Group A shows (23.16) and (100.91) which has the lower mean value of BMI and PCOS Q50 (100.9) is more effective than group B BMI (27.01) and PCOSQ-50 (109.8). Exercise along with dietary plan shows greater improvement among subjects in Group-A (Overweight) with polycystic ovarian syndrome than Group B

Keywords: Polycystic Ovarian Syndrome, Exercise, Overweight, Non–overweight, BMI, PCOSQ-50 Questionnaire, Aerobic resistance, Resistance training, Diet.

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1. INTRODUCTION

Polycystic ovarian syndrome is considered as the most common female endocrine disorder which is a complex multifaceted heterogeneous disorder affecting approx. 5%-10% of respondents of reproductive age.[1,2] It is a true syndrome and being a heterogeneous collection of signs and symptoms it together forms a spectrum of disorder with mild presentation. It is whilst in others there is a severe disturbance of reproductive, endocrine and metabolic function.[3] PCOS is most commonly found in women from teenagers to the menopause stage, higher in women of reproductive age. Common symptoms found in PCOS are: secondary amenorrhea, body hair growing on the chest, belly, face and around the nipples, decreased breast size, irregular periods, male-like characteristics, enlargement of the clitoris, male-pattern baldness, acne, cysts on the ovaries, obesity, skin tags, anxiety or depression, voice gets deeper, dark or thick skin markings and creases around the armpits groin, neck and breasts, dandruff patches on skin on the neck, arm, breasts, thigh, pelvic pain sleep apnea.[4-7] The Patients with PCOS have elevated triglyceride and low-density lipoprotein (LPL) cholesterol levels and low high-density lipoprotein (HDL) cholesterol levels.[8] However, the metabolic and clinical characteristics of PCOS patients who are non-over weight and the efficacy of various forms of exercise have not been evaluated. [9]Combined aerobic and resistance exercise is more effective in improving insulin sensitivity and glycemic control and in reducing abdominal fat in women with PCOS.[12,13] Aerobic exercise training can improve body composition and a number of CVD risk factors of weight loss and insulin sensitivity.[14-17]Endurance training will increase insulin sensitivity to a greater degree than resistance training in younger women, and these changes would be associated with greater reduction in intra-abdominal fat and increased skeletal muscle density. Resistance training is also effective for improving insulin sensitivity and body composition and can preserve lean tissue during energy restricted weight loss.[18-20] Dietary and exercise interventions also have some impact on improvising insulin sensitivity [21,22]. In general, therapies that lower insulin level and insulin resistance leads to weight loss and this may prove useful for treating PCOS, because low carbohydrate diets have shown to reduce insulin resistance. Both diets for overweight and non-overweight women with PCOS are well tolerated with no adverse events or effects reported. Protein intake was higher, and carbohydrate intake was lower on the HP diet than on the LP diet during both energy restriction and weight maintenance. Lifestyle modification including regular exercise appears to be an effective strategy for the management of overweight PCOS women. The combination of exercise and dieting has been extensively reported to substantially increase weight loss compared with dieting or exercise alone.[23,24] Predominantly, lifestyle should be modified with diet and exercise behavior and it is considered to be preferred as the first-line treatment for PCOS management with the primary goal to normalize serum androgen and restore reproductive function[25]. Current dietary and medical advice should continue to focus on weight loss as an important treatment goal in overweight women with PCOS with regard to reduce long term risk. The aim of this present study is to compare the effect of short-term structured exercise in non-over weight and overweight subjects with polycystic ovarian syndrome**.** The objective of this study was to examine the effects of replacing dietary protein with carbohydrates in hypo-caloric energy-restricted diets on weight loss, body composition, glucose and insulin homeostasis, and lipid profile in overweight women with PCOS. This study provides evidence that a short-term hypo-caloric diet, with appropriate supervision and monitoring, has a reasonably high compliance rate in a study setting. Those who complete a hypo-caloric intervention can expect a significant weight loss and significant improvement in their reproductive and metabolic abnormalities. Lifestyle intervention in PCOS is challenging. Potentially, exercise may be more sustainable. Although it is reported that exercise improves surrogate markers of IR and in PCOS, it is accepted that lifestyle modifications in the form of exercise and proper nutrition decreases the risk of developing type2 diabetes.[26] This is of particular relevance for over-weight and obese women with PCOS and insulin resistance, given their risk of developing diabetes is 7-10 times greater compared with women of normal mass who also have PCOS. Exercise training improves endothelial function in patients who exhibit similar risk factors to women with PCOS, weight loss in obese PCOS patients reduces circulating androgens and raises SHBG regularly improves menstrual cycle and fertility rates. The PCOSQ-50 is a valid and reliable instrument for the assessment of quality of life of women with PCOS[27].

2. MATERIALS AND METHODS

30 subjects were taken for this experimental study by using a simple random sampling method from the Outpatient Physiotherapy Department, ACS Medical College and Hospital, vellapanchavadi, Chennai.

2.1 Inclusion Criteria

The subjects with secondary amenorrhoea, body hair growing on the chest, belly, face and around the nipples, decreased breast size, irregular periods, male-like characteristics, enlargement of the clitoris, male-pattern baldness, acne, cysts on the ovaries, overweight, skin tags, anxiety or depression, hoarseness of voice, dark or thick skin markings and creases around the armpits & groin, neck & breasts, dandruff patches on skin on the neck, arm, breasts & thigh, pelvic pain, sleep apnea, age group with 18-25, unmarried women, BMI ranging between 18-25[28].

2.2 Exclusion Criteria

The subjects excluded were those with diabetes, thyroid, adrenal or pituitary gland dysfunction, obese women, undergoing medications, seizures, hypertension, cardiac patients, psychological problems, fracture, Age group(<18 and >25), neurological problems, low back ache, married women, pelvic inflammatory disease, urinary tract infection, recent abdominal surgery . The outcome measure used is the PCOSQ-50 questionnaire and BMI scale. After getting the consent, 30 subjects with polycystic ovarian syndrome were equally divided and allocated into 2 groups. Group-A consists of Over-weight subjects and Group-B consists of Non-over weight subjects, both the groups received aerobic and resistance training. Aerobic training consists of Jogging, Burpees and High knees, Resistance training consists of Chest press, Shoulder press, lunges and Squats with Dumbbell and dietary plans including Hypo caloric diet, High protein diet). They underwent intervention for 56 days with 3 sessions per week on consecutive days; they were also given dietary plans through nutritional seminars by a

registered dietician from a fitness center. The PCOSQ-50 questionnaire was given to them and they were asked to mark it, proper explanation of the questions was given by the researcher.

3. STATISTICAL ANALYSIS

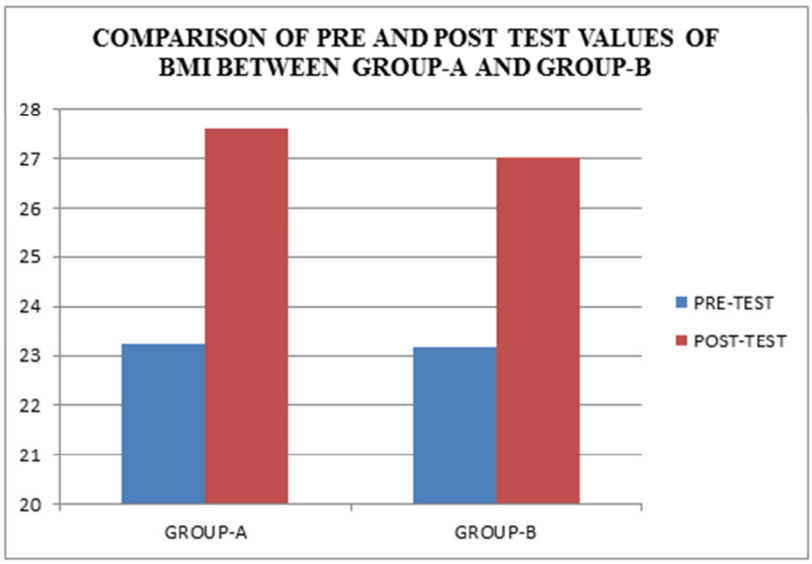
All participants with follow up data were analyzed according to their group allocation. The difference in change from Pre- to the Post-Intervention was assessed using a paired t-Test. Statistical analysis were performed using the software SPSS 24.0 for windows and the difference between the groups was compared by independent t-Test. p value less than 0.05 ($p < 0.05$) was considered to be statistically significant.

4. RESULT

On comparing the mean values of BMI and PCOSQ-50 Questionnaire of Group-A and Group-B from TABLE1 and2, it shows significant decrease in the Post-test mean values of both the groups. Group-A shows mean of (23.16) BMI and (100.91) PCOSQ50 which is comparatively less than Group-B mean values BMI (27.01) and PCOSQ-50 (109.8) mean value at $P \leq 0.001$. Hence the null hypothesis is rejected. Hence the mean values show that Group-A showed greater results when compared to Group-B.

Table1: Comparison Of Pre And Post Test Values Of BMI Between Group-A And Group-B

BMI	GROUP-A		GROUP-B		T-VALUE	
	MEAN	S.D	MEAN	S.D		
PRE-TEST	23.24	1.33	27.61	1.15	-9.56	.000***
POST-TEST	23.16	1.23	27.01	1.23	-8.207	.000***



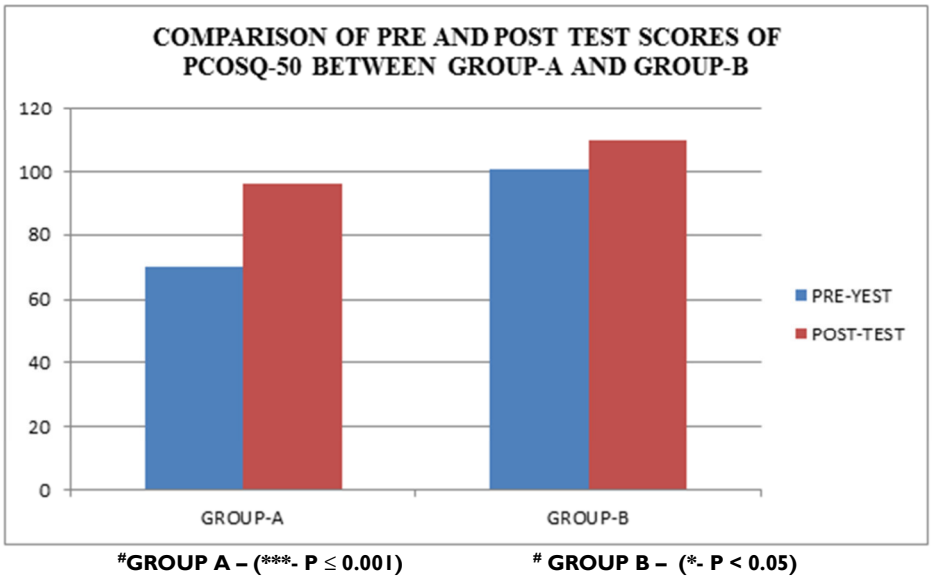
#GROUP A – (*- P ≤ 0.001)** **# GROUP B – (***- P ≤ 0.001)**

Graph1: Comparison of Pre and Post Test Values of BMI between Group-A and Group-B

The above table reveals the Mean, Standard Deviation (S.D), Student t-test, degree of freedom(df) and p-value of the BMI between (Group A) & (Group B) in Pre-test and post test values. In BMI, there is a statistically high significant difference between the pre-test values within GroupA (23.24) and GroupB(27.61) and post-test values within Group A(23.16) and Group B (27.01)**(***- P ≤ 0.001)**

Table 2: Comparison Of Pre And Post Test Scores Of PCOSQ-50 Between Group-A And Group-B

PCOSQ-50	GROUP-A		GROUP-B		t-VALUE	Sig***
	MEAN	S.D	MEAN	S.D		
PRE-TEST	70.0	9.05	97.2	6.98	-9.207	.000***
POST-TEST	100.9	4.96	109.8	13.7	-2.349	.000***



Graph2: Comparison of Pre and Post Test Scores of PCOSQ-50 between Group-A and Group-B

The above table reveals the Mean, Standard Deviation (S.D), Student t-test, degree of freedom(df) and p-value of the PCOSQ-50 between (Group A) & (Group B) in pre test and post test weeks. This table shows that statistically highly significant difference in pre test values of the PCOSQ-50 between Group A (70.0) & Group B (97.2) **(***- P ≤ 0.001)** (Graph-2) This table shows that there is no significant difference in post test values of the PCOSQ-50between Group A (100.9)& Group B (109.8) (*P < 0.05). Both the Groups shows significant increase in the post test Means but Group-A (100.9) which has the lowest mean value is more effective than Group-B (109.8).

5. DISCUSSION

Polycystic Ovarian Syndrome is a common endocrinological disorder in the female and it affects 5-10% of reproductive age. 30 Subjects who have been diagnosed with the symptom of polycystic ovarian syndrome are taken in the sample method. They were divided into two study groups - Group A overweight and Group B non-over-weight. Both the groups were given resistance training, aerobic training and basic dietary plans. Exercise training improves endothelial function in patients who exhibit similar risk factors to women with PCOS. Weight loss in obese PCOS patients reduces circulating androgens and raises SHBG regularly which improves menstrual cycle and fertility rates. Aerobic training can improve the body composition number of CVD risk factors of weight loss and insulin sensitivity. Endurance training will increase the insulin sensitivity to a greater degree. Resistance training is also effective for improving insulin sensitivity and body composition and can preserve lean tissue during energy resistance weight loss. In diet, hypo caloric diet provides significant weight loss and improvement in their reproductive and metabolic abnormalities. BMI was significantly reduced in the PCOS growth maximal aerobic capacity (VO_2max) was significantly improved across the whole Group (P<0.01) with no significant between group differences. Comparative univariate analysis for BMI and fitness level post-exercise showed similar results to those seen at baseline. Many studies have been revealed, L. Tomlinson R. J. Norman et al (2003) "Dietary composition in restoring reproductive and metabolic physiology in overweight women with polycystic ovary syndrome". This study concluded that weight loss leads to improvements in cardiovascular and reproductive parameters potentially mediated by improvements in surrogate measures of insulin resistance. An HP weight loss diet may result in minor differential endocrine and metabolic improvements. Denise S Taylor, Allen Kunselman, et al(2001), in their study "A randomized trial of the effects of two types of short-term hypocaloric diets on weight loss in women with polycystic ovary syndrome". This study concluded that those who completed the short-term hypo caloric diet had a significant weight loss and a significant improvement in their reproductive and metabolic abnormalities [29]. In Karen Elkind-Hirsch, Eric Ravussin, et al (2011), study they showed Aerobic exercise in women with polycystic ovary syndrome improves ovarian morphology independent of changes in body composition. This study concluded that one intriguing finding was that in comparison with dietary restriction (800 kcal/d), aerobic exercise led to a 40% higher rate of ovulation (25% vs. 65%, respectively) and greater improvements in sex hormone–binding globulin (SHBG) and T despite less weight loss [30]. In Amruta Kothare, Chandni Jaisinghani et al (2015) "Inter-Relationship of PCOS with BMI, Obesity and Exercise" they concluded that the level of PCOS awareness was found to be low amongst the PCOS negative respondents and proved PCOS and BMI are highly interdependent[31]. In Victoria SP rung, Christopher J et al (2012) study , exercise training in polycystic ovarian syndrome enhances flow-mediated dilation in the absence of changes in fatness" They claimed that endothelial function assessed in brachial artery with flow mediated dilatation may be considered as a prognostic tool for assessing the , CVD risk[32].

6. CONCLUSION

This study concluded that the mean values of group A and group B on (PCOSQ-50) showed significant results in both the groups. Hence Group B shows more effective results that Group A. Mean values of Group A and Group B on BMI and it shows significant results in both the groups. Both the groups of Over-weight and Non-Over-weight patients with Polycystic Ovarian Syndrome in their study shows a significant results. But, my research has observed that group A is more effective.

7. AUTHORS CONTRIBUTION STATEMENT

G.Yuvarani, G.Tharani, K.Kamatchi - Conceived the idea/experimental design of the study. F.Princy, Performed experiments/data collection. G.Yuvarani, G.Tharani, K.Kamatchi done the Data analysis and interpretation. G.Yuvarani, G.Tharani, K.Kamatchi Primary author (wrote most of the paper or drafted the paper). G.Yuvarani, G.Tharani, K.Kamatchi provided revision to scientific content of the manuscript. I.Sumaya Banu, F.Princy, Provided stylistic/grammatical revision to the manuscript

8. CONFLICT OF INTEREST

Conflict of interest declared none.

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