

## Exercise-Induced Weight Reduction and Fertility Outcomes in Women with Polycystic Ovarian Syndrome who are Obese and Infertile: A Preliminary Report<sup>1</sup>

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### Abstract

The influence of graded Aerobic exercise on obese infertile women with polycystic ovarian syndrome (PCOS), over a period of three months was studied. The study group consisted of 21 women with mean age (34.0±2.0 yrs) and control group consisted of 21 women with mean age (33.0±2.0 yrs) who were clinically, biochemically and ultrasonographically -confirmed cases of Obese, infertile & PCOS. The results of the both groups were compared initially and after three months. The results were analyzed with “t” test. The study group showed significant decrease in mean body mass index as compared to control group. In addition to the reduction in the body weight, the study group also showed increase in ovulation and pregnancy rate, and decrease in ovarian cyst size as compared to control group. The graded aerobic exercise was found to be a definite tool in obese infertile women with polycystic ovarian syndrome.

**Key Words: Obesity, Infertility, PCOS, Body Mass Index, Aerobic exercise**

### Introduction

Body weight is not static and varies throughout the life in response to physical activity, environmental, nutritional, social and psychological factors. Obesity is associated with many abnormal hormonal dynamics. Menstrual disorders are common among women with obesity. It includes dysfunctional uterine bleeding and polycystic ovarian syndrome (PCOS). Often it is difficult to ascertain whether obesity is the cause of menstrual dysfunction or whether the underlying illness is playing the major role (Henley & Vaitukaitis, 1985).

Obesity can effect ovulation, pregnancy rate which leads to infertility or Polycystic Ovarian syndrome (PCOS). The fertility of obese women compared to normal weight women is lower in natural cycles and infertility treatment cycles. Clark *et al.* (1995) reported that even a small weight loss in anovulatory obese

infertile women, achieved in a group setting over a six month period, resulted in an improvement in ovulation, pregnancy rate and pregnancy outcome, self esteem and endocrine parameters. Studies have demonstrated that a BMI greater than 27 is associated with an increased risk of ovulatory infertility. There is considerable evidence in the literature that young, middle aged and elderly women benefit from the endurance exercise training programme & study showed that with the aerobic exercise of 3 to 6 months with diet control had a beneficial effect of weight loss and it has the beneficial effect on reproductive system (Guzick *et al.*, 1994).

Polycystic ovary syndrome (PCOS) is a heterogeneous clinical entity that is defined as the association of hyper androgenism with chronic anovulation in women without specific underlying diseases of the adrenal or pituitary glands. PCOS is also associated with a metabolic

disturbance (insulin resistance). The nature of the complex interrelation of obesity, insulin resistance and endocrine abnormalities in PCOS remains unresolved. However several studies link obesity, body fat distribution and nutritional habits with the hormonal and metabolic profiles of PCOS. Moreover, intervention studies have suggested that reducing weight either by diet alone or by a combination of diet and exercise improve hirsutism, fertility and the hormonal and metabolic profiles of PCOS (ACOG, 2002). There are studies which support the view that graded aerobic exercises has beneficial effect on the reproductive system and the weight loss and however, there exists a controversy whether aerobic exercise alone is effective in altering the reproductive function. Hence, it is worth to find out whether infertility rate will reduce by regular aerobic exercises along with weight reduction and improving the reproductive function.

Therefore, the aim of this study is to determine whether weight reduction through aerobic exercise will improve reproductive function, specifically, ovulation, pregnancy rate, and reduced ovarian cyst size.'

**Material and Method**

A prospective study of 42 women with history of obesity with PCOS and infertility were selected. All women were screened and diagnosed by physician and referred for physiotherapy. Preliminary screening was done to rule out any cardio respiratory and musculoskeletal problems. The subjects were divided in to study and control groups based on inclusion and exclusion criteria. The women who were

willing to participate in the study and had obesity with infertility and PCOS, without any associated cardio respiratory, neurological or musculo skeletal complications & women who were not on any regular exercise regime were included in the study group. The women who were not willing to participate in the exercise program with above mentioned finding were included in the control group.

Both the group of women underwent detailed clinical evaluation for obesity like body mass index, waist-hip ratio and skin fold measurements before and at the end of the study. The ovarian cyst was measured before and after three months. Study group women were prescribed 3 months period of home based graded aerobic exercise program. All women were periodically assessed once in every three weeks during the study period and individualized graded exercise program was prescribed with the intensity between 50-80% MHR. All the women completed the study with out any complications. Both study and control groups were re-assessed at the end of three months. The data was statistically analyzed with t test.

**Results & Discussion**

The demographic features of 42 patients with PCOS are presented in the Table I.

Table 1: Demographic features of patients with PCOS in study and control group

Patients data	Study Group	Control Group
Age	34.0±2.0	33.0±2.0
Primary Infertility (N)	15	16
Secondary Infertility (N)	6	5

Table 2: Comparison of Body Mass Index before and After Exercise programme in Study Group

BMI	Study Group		95% Confidence Interval Of The Difference		t	P
	Mean	SD	Lower	Upper		
Pre	33.12	1.72				
			26.56	27.88	83.15	0.0001
Post	27.22	2.12				

The pre-exercise body mass index of study group was  $33.12 \pm 1.72 \text{ kg/m}^2$ , the post exercise body mass index levels were  $27.22 \pm 2.12 \text{ kg/m}^2$  (Table 2).

Table 3: Comparison of Body Mass Index before and after three months in Control Group

BMI	Study Group		95% Confidence Interval Of The Difference		t	P
	Mean	SD	Lower	Upper		
Pre	30.63	1.09				
			28.85	29.42	206.32	0.0001
Post	29.82	0.91				

For control group the initial body mass index values were  $30.63 \pm 1.09 \text{ kg/m}^2$ . After three months of observation, the values were  $29.82 \pm 0.91 \text{ kg/m}^2$  (Table 3).

### Discussion

Obesity affects ovulation, response to fertility treatment, pregnancy rates and outcome. In our prospective study, aerobic exercise program was prescribed to find out whether it could help obese infertile women, irrespective of their infertility diagnosis, to achieve a viable pregnancy, ideally without further medical intervention. The subjects underwent a graded home based exercise programme aimed at reducing weight over a period of 3 months and those that did not participate in the exercise program were treated as a control group. Women in the study group lost an average of 8.2 kg, with 5 of the 21 anovulatory subjects resuming spontaneous ovulation, 7 achieving a pregnancy and 9 women had

reduction in the cyst size, which was confirmed by ultrasound. In the control group, women lost an average of 2.1 kg, however, there was no change in the cyst size, none of the women achieved pregnancy.

*Guzick et al. (1994)* reported that weight loss in obese anovulatory women is often associated with resumption of menstrual function and with alterations in androgen, gonadotropin and insulin concentration. In the present study, aerobic exercise is observed to be effective in obese women with infertility and PCOS. The study group population showed significant decrease in body mass index as compared to control group.

Studies by *Mitchell and Rogers (1953)* and *Bates and Whitworth (1982)* give credence to the idea that weight loss can restore ovulatory function in obese anovulatory hyperandrogenic subjects. *Bates and Whitworth (1982)* in their study on moderately obese anovulatory women also reported regained ovulatory function after weight loss. They further reported that the mean percent of ideal body weight at the time of conception in their subjects' was 123%. Similar results were reported by *Mitchell and Rogers (1953)*.

*Kopelman et al. (1981)* reported improvement in menstrual function following weight loss induced by ileal jejunal bypass. *Kim et al. (1982)* observed persistent anovulation following a mean weight loss of 16% in four anovulatory massively obese women. However, despite the weight loss, these women remained significantly obese. It should be noted that in none of these studies was it noted at what age the subjects became obese or at what weight ovulatory function was lost. These factors

may prove in the future to be of extreme importance in counseling patients as to the effectiveness of weight loss with its feasibility. *Bates and Whitworth (1982)* have acknowledged that the eight women who refused the weight reduction program failed to conceive or remained anovulatory and were heavier at the initiation of the study than those who conceived.

In addition to sustained compliance, the effectiveness of an exercise program is to a large extent, predicated on an appropriate exercise prescription. There are three phases included in the typical exercise session: warm-up, stimulus phase, and cool down.

The stimulus or endurance phase serves to stimulate the oxygen transport system and maximize caloric expenditure. This phase should be prescribed in specific terms of frequency, intensity, duration and mode of exercise. In obese infertile women with PCOS the following exercise guidelines are required to reduce weight and thereby stabilizing the reproductive hormones function.

*Frequency:* 3-5 exercise sessions per week.

*Intensity:* 60% to 85% of maximal heart rate range corresponding to ratings of perceived exertion (RPE 6-20 scale) between "13" (some what hard) and "15" hard, respectively is advisable in the obese infertile and PCOS women (*Laeson et al., 1987*).

*Duration:* Initially start from fifteen minutes and it can be increased to forty five min of sustained activity during each exercise session in addition to warm-up and cool –down.

*Mode:* Any activity that employs large muscle groups, is maintained continuously, and is rhythmical in nature e.g. walking, jogging.

There is now considerable evidence in the literature that young middle-aged and elderly women benefit from endurance exercise training programs. The results show that women adapt to physical conditioning in the same qualitative manner as do men, demonstrating significant increases in aerobic capacity and anaerobic threshold (*Laeson et al., 1987*), with decreases in heart rate, blood pressure, and perceived exertion at standard sub maximal workloads (*White et al., 1984*). Other favorable changes in women exercisers include decreased cholesterol and blood pressure levels, reduced body weight and fat stores, improved strength, favorable effects on reproductive hormones and increased bone mineral content (*Lefebvre et al., 1997*). However, the mechanism by which exercise is effective in stabilizing the reproductive hormones in obese infertile and PCOS and decreasing the cyst size needs to be studied in future research.

#### *Conclusion*

1. Graded aerobic exercise is a definite tool in decreasing the body weight in obese infertile women with PCOS as compared to control group.
2. The graded aerobic exercise helps in reducing the cyst size, increasing the ovulation, pregnancy rate as compared to control group.

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