

# Effect of hypocaloric diet and home based exercises in improving fertility in polycystic ovarian syndrome patients

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## Abstract

**Background:** Polycystic ovarian syndrome (PCOS) is a complex heterogeneous endocrine disorder. It is a common disorder affecting 4-12% of women of reproductive age. **Aims and Objectives:** To Study effectiveness of Exercise for the management of infertility in the patients of PCOD. **Methodology:** After the permission of Institutional ethical committee this prospective study was carried out. 61 women who diagnosed PCOS at the Department of OBGY of a tertiary health care during the one year period i.e. January 2016 to January 2017 were included into study. Those who want to participate the exercise program for six month were included in Study group (n=29) the women who were not willing to participate in the exercise program were enrolled in control group (32). All the women completed the study without any complications. For hirsutism ferriman-gallwey semi quantitative scoring was used and for Acne Global acne grading system 13 was calculated. The data was analysed at 6 month period after treatment. The statistical analysis paired t-test and chi-square test was applied. **Result:** Variables of Control and study group were significantly differed i.e. Average Body weight (kg)  $83.64 \pm 3.12$ , And  $74.96 \pm 1.32$  ( $t = 13.89$ ,  $df = 59$ ,  $P < .0001$ ), Average BMI (kg/m<sup>2</sup>)  $33.85 \pm 1.11$ ,  $27.85 \pm 1.24$  ( $t = 20.10$ ,  $df = 59$ ,  $P < .0001$ ), Average Waist circumference (cm)  $101.23 \pm 2.92$ ,  $95.12 \pm 1.34$  ( $t = 19.34$ ,  $df = 59$ ,  $P < .001$ ), Average Hirsutism score  $19.13 \pm 4.65$ ,  $12.43 \pm 2.54$  ( $t = 11.2$ ,  $df = 59$ ,  $P < .01$ ). Menstrual history of Control and Study group differed significantly, Average Number of menstrual cycles  $4.92 \pm 1.21$  and  $7.92 \pm 1.1$  ( $t = 10.09$ ,  $df = 59$ ,  $P < 0.001$ ). Amenorrhea, Oligomenorrhea, Regular cycles was of control and study were 31.03%, 51.72 %, 0.0% and 37.5%, 20.68%, 62.5% respectively. ( $\chi^2 = 21.13$ ,  $df = 2$ ,  $P < 0.001$ ). Fertility parameters studied by Ultrasound like average Antral follicle count in Study group i.e. (AFC)  $13.1 \pm 3.62$  was significantly more in control group i.e.  $8.92 \pm 4.72$ . ( $t = 11.22$ ,  $df = 59$ ,  $P < 0.001$ ), but Total ovarian volume (CC) was not differed in the two groups i.e.  $13.12 \pm 6.52$ ,  $12.92 \pm 5.82$  respectively in control and study group. Effect of Clomiphene in two different groups; Average Ovulation per treatment cycle differed significantly in control group i.e.  $0.42 \pm 0.13$  as compared to study group  $1.62 \pm 0.23$  ( $t = 9.23$ ,  $df = 59$ ,  $P < 0.01$ ), but the pregnancy outcome like Pregnancy loss among patients who conceived were good in study group i.e. 3/14 (21.42%) as compared to 3/4 (75%) but this is not statistically significant ( $\chi^2 = 1.969$ ,  $df = 1$ ,  $P < 0.1606$ ). **Conclusion:** It can be concluded from our study that the 3 month home based aerobic exercise program significantly improved the fertility parameters like average Antral follicle count, Average Ovulation per clomiphene treatment cycle, More no of Regular cycles of menstruation also the parameters like Average Hirsutism score. Average Body weight, Average BMI, Average Waist circumference were significantly reduced. So from our study we recommend 3 month home based aerobic exercise program for the improvement of PCOS symptoms.

**Key Words:** PCOD/PCOS (Polycystic Ovarian Disease/Syndrome), BMI, Hirsutism score, Average, Acne Score.

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## INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a complex heterogeneous endocrine disorder. It is a common disorder affecting 4-12% of women of reproductive age<sup>1,2</sup>. PCOS was first described in the United States in 1935<sup>3</sup>. PCOS is characterized by chronic an ovulation and

hyperandrogenism in the absence of underlying adrenal or pituitary disease. Women with PCOS may complain about variable clinical manifestations including oligomenorrhea, hirsutism, acne, and infertility<sup>4</sup>. Approximately 75% of these women suffer from infertility due to anovulation. Therefore, it is the most common cause of anovulatory infertility<sup>5,6</sup>. PCOS is also reported to be associated with obesity, insulin resistance and type II diabetes, dyslipidemia, hypertension, cardiovascular disease and endometrial carcinoma<sup>7,8,9</sup>. Approximately 50-60% of women with the syndrome are overweight or obese compared to 30% of women in the general population<sup>10,11</sup>.

## MATERIAL AND METHODS

After the permission of Institutional ethical committee this prospective study was carried out. All women were screened for PCOS those who fulfil the Clinical and sonographic criteria i.e. It has been proposed that at least four of the following five criteria are needed to define adolescent PCOS<sup>14</sup>: Oligomenorrhea or amenorrhea, 2 years after menarche; Clinical hyperandrogenism: persistent acne or severe hirsutism; Biologic hyperandrogenism: elevated plasma testosterone or increased LH:FSH ratio; Insulin resistance/hyperinsulinemia: acanthosis nigricans, abdominal obesity or glucose intolerance; Polycystic ovaries on ultrasound: enlarged ovaries, peripheral microcysts or increased stroma of it were included into study so such 61 women who diagnosed PCOS at the Department of OBGY of a tertiary health care during the one year period i.e. January 2016 to January 2017 were included into study. Those who want to participate the exercise program for six month were included in **Study group** (n=29) the women who were not willing to participate in the exercise program were enrolled in **control group (32)**. Those who willing to Participate 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 without any complications. For hirsutism ferriman-gallwey semi quantitative scoring<sup>12</sup> also the fertility related indicators like Antral follicle count (AFC), Total ovarian volume (CC) was studied by USG, also the outcome of this with the treatment of Clomiphene parameters like Average Ovulation per treatment cycle, Pregnancy/ Conception (serum hCG level >10 mIU/mL), Pregnancy loss among patients who conceived etc. was assessed. The data was analyses at 6month period after treatment. The statistical analysis paired t-test and chi-square test was applied.

## RESULT

The average age of the women were  $25 \pm 1.43$  Yrs.

**Table 1:** Distribution of the patients as per the variable at Baseline and after six months

Variables	Control (32)	Study Group (29)	t- test	P-value
Average Body weight (kg)	$83.64 \pm 3.12$	$74.96 \pm 1.32$	$t = 13.89$ $df = 59$	$< .0001$
Average BMI (kg/m <sup>2</sup> )	$33.85 \pm 1.11$	$27.85 \pm 1.24$	$t = 20.10$ $df = 59$	$< .0001$
Average Waist circumference (cm)	$101.23 \pm 2.92$	$95.12 \pm 1.34$	$t = 19.34$ $df = 59$	$< .001$
Average Hirsutism score	$19.13 \pm 4.65$	$12.43 \pm 2.54$	$t = 11.2$ $df = 59$	$< .01$

Variables of Control and study group were significantly differed i.e. Average Body weight (kg)  $83.64 \pm 3.12$ , And  $74.96 \pm 1.32$  ( $t = 13.89$ ,  $df = 59$ ,  $P < .0001$ ), Average BMI (kg/m<sup>2</sup>)  $33.85 \pm 1.11$ ,  $27.85 \pm 1.24$  ( $t = 20.10$ ,  $df = 59$ ,  $P < .0001$ ), Average Waist circumference (cm)  $101.23 \pm 2.92$ ,  $95.12 \pm 1.34$  ( $t = 19.34$ ,  $df = 59$ ,  $P < .001$ ), Average Hirsutism score  $19.13 \pm 4.65$ ,  $12.43 \pm 2.54$  ( $t = 11.2$ ,  $df = 59$ ,  $P < .01$ ).

**Table 2:** Distribution of the patients as per the Menstrual history at baseline and after six month

Menstrual History	Control (32)	Study Group (29)	P value
Average Number of menstrual cycles	$4.92 \pm 1.21$	$7.92 \pm 1.1$	$t = 10.09$ $df = 59$ $P < 0.001$
Amenorrhea	12 37.5%	6 20.68%	$\chi^2 = 21.13$ , $df = 2$ $< 0.0001$
Oligomenorrhea	20 62.5%	9 31.03%	
Regular	0 0.0%	15 51.72 %	

Menstrual history of Control and Study group differed significantly, Average Number of menstrual cycles  $4.92 \pm 1.21$  and  $7.92 \pm 1.1$  ( $t = 10.09$ ,  $df = 59$ ,  $P < 0.001$ ). Amenorrhea, Oligomenorrhea, Regular cycles was of control and study were 31.03%, 51.72 %, 0.0% and 37.5%, 20.68%, 62.5% respectively. ( $\chi^2 = 21.13$ ,  $df = 2$ ,  $P < 0.001$ ).

**Table 3:** Study of Fertility parameters studied by Ultrasound

Fertility parameters	Control (32)	Study (29)	P-value
Antral follicle count (AFC)	$8.92 \pm 4.72$	$13.1 \pm 3.62$	$t = 11.22$ $df = 59$ $P < 0.001$
Total ovarian volume (CC)	$13.12 \pm 6.52$	$12.92 \pm 5.82$	$t = 1.21$ $df = 59$ $P > 0.01$

From above table, it is clear that average Antral follicle count in Study group i.e. (AFC)  $13.1 \pm 3.62$  was significantly more in control group i.e.  $8.92 \pm 4.72$ . ( $t = 11.22$ ,  $df = 59$ ,  $P < 0.001$ ), but Total ovarian volume

(CC) was not differed in the two groups i.e.  $13.12 \pm 6.52$ ,  $12.92 \pm 5.82$  respectively in control and study group.

**Table 4: Effect of Clomiphene in two different groups**

Outcome	Control (32)	Study (29)	P-value
Average Ovulation per treatment cycle	$0.42 \pm 0.13$	$1.62 \pm 0.23$	$t=9.23$ $df = 59$ $P<0.01$
Pregnancy Conception (serum hCG level >10 mIU/mL)	4/32 (12.5)	14 (48.26)	$\chi^2=9.361$ , $df=1$ , $P<0.001$
Pregnancy loss among patients who conceived	3/4 (75%)	3/14 (21.42%)	$\chi^2=1.969$ , $df=1$ , $P<0.1606$ .

Effect of Clomiphene in two different groups; Average Ovulation per treatment cycle differed significantly in control group i.e.  $0.42 \pm 0.13$  as compared to study group  $1.62 \pm 0.23$  ( $t=9.23$   $df = 59$ ,  $P<0.01$ ), but the pregnancy outcome like Pregnancy loss among patients who conceived were good in study group i.e. 3/14 (21.42%) as compared to 3/4 (75%) but this is not statistically significant ( $\chi^2=1.969$ ,  $df=1$ ,  $P<0.1606$ ).

## DISCUSSION

Lifestyle changes remain a concern for young women with PCOS. Lifestyle modifications geared to prevent long-term sequel remain the first-line treatment.<sup>15</sup> Lifestyle changes, including diet, exercise, and behavioral modification, appear to improve the metabolic and reproductive abnormalities of overweight and obese patients with PCOS. Therefore, lifestyle changes appear to represent the first-line management for all overweight and obese patients with PCOS.<sup>16</sup> Weight loss can be very effective in lessening many of the health conditions associated with PCOS, such as high blood pressure and diabetes. Sometimes weight loss alone can restore hormone levels to normal, causing many of the symptoms to disappear or become less severe. Healthy food habits and exercise is a great way to help combat the weight gain. Talking with other teens and women with PCOS is a great way to share information about treatment and get support.<sup>17</sup> Variables of Control and study group were significantly differed i.e. Average Body weight (kg)  $83.64 \pm 3.12$ , And  $74.96 \pm 1.32$  ( $t = 13.89$ ,  $df = 59$ ,  $P<.0001$ ), Average BMI (kg/m<sup>2</sup>)  $33.85 \pm 1.11$ ,  $27.85 \pm 1.24$  ( $t = 20.10$ ,  $df = 59$ ,  $P<.0001$ ), Average Waist circumference (cm)  $101.23 \pm 2.92$ ,  $95.12 \pm 1.34$  ( $t=19.34$ ,  $df = 59$   $P<.001$ ), Average Hirsutism score  $19.13 \pm 4.65$ ,  $12.43 \pm 2.54$  ( $t=11.2$ ,  $df = 59$   $P<.01$ ). Menstrual history of Control and Study group differed significantly, Average Number of menstrual cycles  $4.92 \pm 1.21$  and  $7.92 \pm 1.1$  ( $t = 10.09$ ,  $df = 59$ ,  $P<0.001$ ). Amenorrhea, Oligomenorrhea, Regular cycles was of control and study were 31.03%, 51.72 %, 0.0% and 37.5%, 20.68%, 62.5%

respectively. ( $\chi^2=21.13$ ,  $df=2$ ,  $P<0.001$ ). Fertility parameters studied by Ultrasound like average Antral follicle count in Study group i.e. (AFC)  $13.1 \pm 3.62$  was significantly more in control group i.e.  $8.92 \pm 4.72$ . ( $t=11.22$ ,  $df = 59$ ,  $P<0.001$ ), but Total ovarian volume (CC) was not differed in the two groups i.e.  $13.12 \pm 6.52$ ,  $12.92 \pm 5.82$  respectively in control and study group. Effect of Clomiphene in two different groups ; Average Ovulation per treatment cycle differed significantly in control group i.e.  $0.42 \pm 0.13$  as compared to study group  $1.62 \pm 0.23$  ( $t=9.23$   $df = 59$ ,  $P<0.01$ ), but the pregnancy outcome like Pregnancy loss among patients who conceived were good in study group i.e. 3/14 (21.42%) as compared to 3/4 (75%) but this is not statistically significant ( $\chi^2=1.969$ ,  $df=1$ ,  $P<0.1606$ ). These findings are similar to Somaya Ouda *et al.*<sup>18</sup> they found highly significant improvements of menstrual frequency, problems and weight loss ( $P<.001$ ). Also highly significant decreases in waist circumference ( $P<.001$ ) and highly significant reduction in hirsutism total score and total acne score. Also similar to Maiya *et al*<sup>19</sup> 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.

## CONCLUSION

It can be concluded from our study that the 3 month home based aerobic exercise program significantly improved the fertility parameters like average Antral follicle count, Average Ovulation per clomiphene treatment cycle, More no of Regular cycles of menstruation also the parameters like Average Hirsutism score. Average Body weight, Average BMI, Average Waist circumference were significantly reduced. So from our study we recommend 3 month home based aerobic exercise program for the improvement of PCOS symptoms.

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