ORIGINAL ARTICLE

Effect of aerobic exercise (self-help strategy) on the common endocrine problem (PCOS) in late adolescent & young women & impact on their quality of life

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ABSTRACT

The main objective of the study is to find out the effect of aerobic exercise in PCOS of late adolescent & young women. It is a prospective study conducted at Saveetha Medical College Obstetrics& Gynaecology Department. After obtaining approval from IRB, after obtaining informed consent, fifty women with polycystic ovary syndrome between the 16 years and 35 years were recruited. After clinical diagnosis of PCOS made, BMI, abdominal circumference, WHR were checked and USG was done. The number of ovarian follicles in the periphery, the diameter of follicles, ovarian volume was noted and USG was repeated after 16 weeks. TFT, fasting Insulin & blood sugar, serum testosterone, HDL, LDL, triglycerides, total cholesterol, were done. Baseline levels and after 16 weeks of aerobic exercise training, again levels were measured. Aerobic exercise was performed under supervision at physiotherapy clinic of the Saveetha Physiotherapy Department. Five sessions per week each session lasting for 45 minutes. The exercise was prescribed on an individual basis with the objective to achieve specified exercise energy expenditure (ExEE). Our inclusion criteria were women with PCOS between the 16 to 35 years, BMI> or = 24.9 & <29.9 (overweight), USG criteria for PCOS. Our exclusion criteria were women with the Thyroid disorder, Diabetes, Athletes, taking Oral contraceptives / any other hormonal drugs within last one month. This study showed statistically significant improvement in WHR (P <0.0001), reduction in the number of follicle and ovarian volume (P<0.0001), restoration of ovulation (P<0.002) overall decrease in insulin resistance (P<0.008), reduction in lipid profile (P<0.0001) and Quality of life (P= 0.0035). This study concludes that the aerobic exercise improves the waist-hip ratio (WHR), metabolic and reproductive function in women with PCOS and thereby has a good impact on a quality of life.

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INTRODUCTION

Polycystic ovary syndrome can be defined as chronic hyperandrogenic anovulation characterized by the accumulation of numerous peripherally placed follicles on the ovaries associated with high serum testosterone and other metabolic disturbances. The cause of PCOS is unknown. Polycystic ovary syndrome (PCOS) is the common endocrine disorder in women causes physical and psychological damage. It is a complex hormonal disturbance that affects the entire body and has numerous implications for general health and should be considered a multifaceted disease. It is the most common hormonal abnormality in women of reproductive

age and can cause of infertility. A recent study has shown that 13.56% of the girls have menstrual dysfunction and the rate of detection of PCOS among them is 72.3%. Women with this syndrome have, over the course of their life, an increased risk of coronary disease, diabetes and endometrial cancer. (A Danililidis and K Dinas 2009).

Chronic Anovulation, Hyperandrogenism, and insulin resistance (IR) are its main characteristics. Insulin resistance has a pivotal role in the pathophysiology of this syndrome and obesity. Specifically, central obesity has a strong correlation with it (Rotterdam 2004) Weight loss can improve endocrine and metabolic disorders such as glucose intolerance in PCOS. Increased BMI, IR and leptin in PCOS women are associated with infertility (Namavar Jahromi B *et al.,* 2017). With a gradual decrease in body weight and abdominal fat, insulin sensitivity increases and ovulation restores in overweight or obese women with PCOS. Weight loss also improves fertility in PCOS. Hyperandrogenism, IR and hyperinsulinism will be severe in Obese PCOS (LiX1, Lin JF 2005). Hyperandrogenism is associated with Metabolic Syndrome (Coviello AD 2006) Central obesity and insulin resistance, in turn, causes steroidogenic dysregulation. (Ságodi L *et al.,* 2013) moreover, visceral adiposity associated with metabolic syndrome (Rossi B *et al.,* 2008).

There are three broad reasons why PCOS patients seek medical care: 1) menstrual cycle disturbance and infertility 2) problems of appearance and self-esteem arising from obesity and excessive hair growth, and 3) metabolic derangements, including abnormalities in blood fat (lipid) levels, insulin /glucose impairment and for hypertension. Treatment of PCOS is focused primarily on both normalizing menstrual and anovulation and reducing metabolic complications (Al-Thahab *et al.,* 2018).

The study aimed to find out the effect of aerobic exercise in PCOS of late adolescent & young women. The objective of the study was **t**o evaluate the effect of aerobic exercise in reducing BMI, WHR number of follicles, ovarian volume and improvement in menstrual irregularity (Lateef *et al.,* 2018). To evaluate the effect of aerobic exercise in reproductive function in PCOS women. To assess its impact on the quality of life in women with Polycystic Ovarian Syndrome (Azhar Omaran, 2017).

MATERIAL AND METHODS

It is a prospective study conducted at Saveetha Medical College Obstetrics & Gynaecology Department. After obtaining approval from IRB, after obtaining informed consent, fifty women with polycystic ovary syndrome between the 16 years and 35 years were recruited. After clinical and USG diagnosis of PCOS made, BMI, abdominal girth, WHR was checked and USG was done - the number of ovarian follicles in the periphery, the diameter of follicles, ovarian volume were noted and USG was repeated after16 weeks. TFT, fasting Insulin & blood sugar, serum testosterone, HDL, LDL, triglycerides, total cholesterol, were done. Baseline levels and after 16 weeks of aerobic exercise training levels were measured. Aerobic exercise was performed under supervision at a physiotherapy clinic. Five sessions per week each session lasting for 45 minutes. The exercise was prescribed on an individual basis with the objective to achieve specified exercise energy expenditure (ExEE). Our inclusion criteria were women with PCOS between 16 to 35 years, BMI >or = 24.9 &< 29.9(overweight), USG criteria for PCOS. Our exclusion criteria were women with the Thyroid disorder, Diabetes, Athletes, taking Oral contraceptives / any other hormonal drugs within last one month.

Aerobic Exercise: The training course included 5 sessions per week, each lasting 45 minutes for 16 weeks. The first 5 minutes in each session will be for warm-up, the next 35 minutes for exercise and the last 5 minutes for cooling down. Warm up & cool down exercise includes walking and stretching the muscles. Actual training would then start in the treadmill with a speed that was determined using VO2 max for 45 minutes. VO2 max will be measured using the modified Bruce protocol. BMI, Abdominal circumference, Waist-hip ratio were measured weekly and participants completed a menstrual cycle diary before and after an exercise session. A validated questionnaire was constructed addressing PCOS-specific issues. On a five-point rating scale (not at all, a little, average, more than average, and very much), participants rated the impact of excess body hair, obesity, menstrual disorders and infertility, self-esteem

Outcome Measured: Reproductive measures (ovulation, menstrual regularity and fertility Abdominal Obesity, Insulin resistance (IR)

Cardiovascular risk factors - blood pressure, lipid profiles

Quality of Life- Self-esteem, body hair, weight, infertility, and menstrual problems

RESULTS

The paired t-test was used for statistical analysis at a CI of 95 and p-value calculated shows the significant result on the pre and posttest for the following parameters. Table1 shows the distribution of age in our study. 66% of them from late adolescent and young women less than 30 years. Table2 reveals the common complaints in our study. 76% had menstrual irregularity, 44% had an increase in

Table 1: Age distribution

Age	No	Percentage
16-20 yrs	16	32%
21-25 yrs	17	34%
26-30yrs	11	22%
31-35yrs	6	12%

Distribution of age in our study. 66% of them from late adolescent and young women less than 30 years

Table 2: Common Complaints in PCOS

Particulars	No	Percentage
Increase in body weight	22	44%
Abnormal hair Pattern	18	36%
Acne	9	18%
Menstrual irregularity	38	76%
Infertility	12	24%

The common complaints in our study. 76% had menstrual irregularity, 44% had an increase in body weight, abnormal hair in 3 infertility in 24and Acne in 18%

Table 3: Effect of Aerobic exercise on BMI, Waist Circumference 88 &WHR (0.85)

Parameters	Pretest-mean	Posttest-mean	p-value
BMI	29.5+/-0.5	29.6+/-0.5	0.0294-NS
Waist circumference	83.0+/-0.5	82.4+/-0.5	0.0001-S
WHR	0.86 +/-0.02	0.84+/-0.02	0.0001-S

The effect of aerobic exercise on BMI, Waist circumference and WHR. There was a statistically significant reduction. Reduction in waist circumference with a p-value of 0.0001 and WHR with a p-value of 0.0001 –but BMI not decreased significantly. Aerobic exercise helps in reducing abdominal obesity.

Table 4: Effect of Effect of Aerobic Exercise on Menstrual cycle &USG changes

Parameter	Pretest-Mean	Post test-Mean	P value
Menstrual irregularity	38.6+/-6.7	14.4+/-1.5	<0.008 -S
Ovulation	13.1+/-1.5	30.3 +/-3.7	<0.002-S
USG –No. Follicules	Mean 10-12	Mean 6-8	<0.0001-S
USG Follicle-Diameter	Mean 7.4 mm	Mean 7.1mm	<0.0286
USG Ovarian Volume	Mean 11.2cm3	Mean 9.2cm3	<0.0001

Changes in profile and USG changes. Menstrual regularity restored significantly with a p-value of <0.008, reduction in the number of the follicle and ovarian volume (P <0.0001), restoration of ovulation (P<0.002).

body weight, abnormal hair in 3, infertility in 24 and Acne in 18%. Table 3 shows the effect of aerobic exercise on BMI, Waist circumference and WHR. There was a statistically significant reduction. Reduction in waist circumference with a p-value of 0.0001 and WHR with a p-value of 0.0001 –but BMI not decreased significantly. Aerobic exercise helps in reducing abdominal obesity. Table 4 shows changes in profile and USG changes and menstrual pattern. Menstrual regularity restored significantly with p-value of <0.008, reduction in the number of follicle and ovarian volume (P < 0.0001) restoration of ovulation (P<0.002, Table5 shows an overall decrease in insulin resistance (P<0.008) Table 6 shows reduction in lipid profile (P<0.0001) and fig 1 shows improvement in Quality of life (P= 0.0035).

DISCUSSION

The polycystic ovarian syndrome is the most common endocrine disorder occurs in women with childbearing age. It challenges their fertility. The women with polycystic ovarian syndrome report irregular menstrual cycles, a sudden increase in body weight, the growth of excess facial hair, easy fatigability. A study by Taponen S *et al.,* 2004 showed menstrual abnormality in 37.3% and hirsutism in 18.2%, but in our study menstrual irregularity in 76% and hirsutism in 18%. These women will have low self-esteem and could not be able to overcome these changes only through medications. In Yildiz BO *et al.,* 2008 study prevalence of PCOS seen in overweight, and obese women were 9.0, and 9.9% and in our study 44% of the women had an increase in weight. It is usually recommended to lose body weight in PCOS women before initiating pharmacological treatment. So they

Table 5: Effect of Aerobic Exercise on fasting & Insulin resistance, Serum testosterone

Parameter	Pretest mean	Post test-mean	P value
Fasting blood sugar	110+/-2.4	102.5+/-2.0	<.001 -S
Fasting Insulin	30.4+/- 1.4	24.8+/-1.0	<0.008 -S
HOMA-IR	8.7+/-0.5	6.5+/-0.4	<0.001 -S
Serum Testosterone	2.1+/-0.5	0.8+/-0.2	<0.001-S

The overall decrease in insulin resistance (P<0.008)

Table 6: Effect of Aerobic Exercise on Lipid profile

Parameters	Pre-test	Post-test	P value
HDL	35.2+/-1.1	39.9+/-1.1	<0.001 -S
LDL	140.7+/-1.8	134.8+/-1.8	<0.001 -S
Total Cholesterol	211.3+/-2.9	195.9+/-2.0	<0.001 -S
Triglycerides	161.6+/-2.2	150.3+/-2.4	<0.001-S

Reduction in lipid profile (P<0.0001)
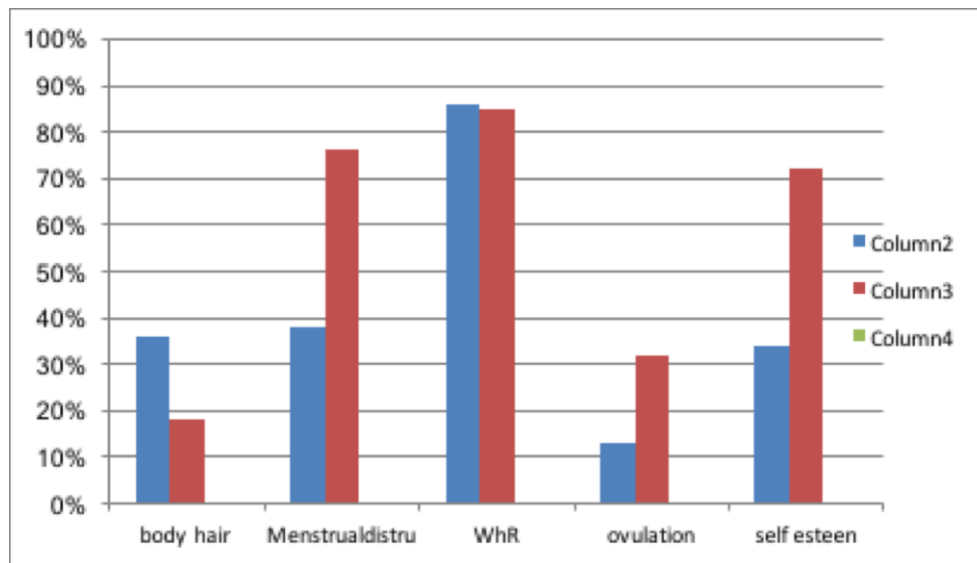
Figure 1: Quality of life assessed by Self-esteem, body hair, weight, ovulation, and menstrual problems

need some exercises to reduce body weight and to overcome these changes. The aerobic exercise reduces the abdominal obesity and there will be an increase in the insulin sensitivity and it restores the ovulation. Some of the studies had proved that the weight loss improves the fertility in the women with the polycystic ovarian syndrome. Norman RJ *et al.,* 2004 in his stud stated that, the association between obesity and/or PCOS and hyperinsulinaemia, hyperandrogenism and abnormal secretion of other hormones, such as leptin, underlies many reproductive disorders observed in this population. It has been demonstrated that weight loss can improve the fertility of obese women through the recovery of spontaneous ovulation. In our study ovulation was restored significantly with p-value of <0.002 According to Einas Al-Eisa E 2017 there were 43.3% improvements in ovarian process and 56.7% a restoration of menstrual cycle following 12 weeks of supervised aerobic exercise and our study showed menstrual regularity restored significantly with p-value of <0.008, reduction in the number of follicles and ovarian volume (P < 0.0001), restoration of ovulation (P<0.002).

Palomba S *et al.,* 2007 study, there was a significant change in waist circumference, insulin resistance indexes and serum levels of sex hormone-binding globulin, androstenedione and dehydroepiandrosterone sulphate with structure exercise with P < 0.05) In this study, 50 PCOS women were selected and aerobic exercise was given for 16 weeks. After this 16 weeks programme, the patients show a significant reduction in Waist-hip ratio reduction in some follicles and restoration of ovulation were also noted. Ramos FK *et al.,* 2016 study showed significant improvements in vitality, social aspects, and mental health after 16 week exercise (p ≤ 0.01) and this study based on five important demine Quality of life was assessed and had improvement in Quality of life (P= 0.0035)

Therefore, the aerobic training programme can lead to a significant improvement in the quality of life in PCOS women. This training programme is the simple, self-help strategy form of treatment.

Future research is necessary before the results of this study can be applied to a larger population of women with PCOS.

CONCLUSION

This study proves that the 16 week aerobic training programme improves the quality of life and mainly because of reduction in abdominal obesity and regularization of menstrual pattern restoration of ovulation thereby there is an improvement in their self-esteem and quality of life in women with the polycystic ovarian syndrome.

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