

# Effect of Resistance Exercise Training Program on Quality of Life in Women with and without Polycystic Ovary Syndrome; A Cross Sectional Survey

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## ABSTRACT

**Background:** Polycystic ovary syndrome affects between 5% and 10% of reproductive-age women. Acanthosis nigricans is common in these patients and increases the risk of insulin resistance. These clinical symptoms could be detrimental to an individual's self-esteem and quality of life.

**Objective:** The objective of this study was to determine the effect of resistance exercise training program on the quality of life in females with and without polycystic ovarian syndrome.

**Methods:** This was a non-randomized 8-week clinical trial, conducted from July 2021 to January 2022, in community women of reproductive age 18 to 45 taken as controls and women having polycystic ovarian syndrome enrolled at Link Medical Centre, Lahore. The inclusion criteria were women having polycystic ovarian syndrome, diagnosed using the Rotterdam Consensus, having amenorrhea or oligomenorrhea, biochemical and/or clinical evidence of polycystic ovaries or hyperandrogenism found by pelvic ultrasonography. The research analysed 79 polycystic ovarian syndrome women and 64 healthy women. polycystic ovarian syndrome and healthy control groups were tested at baseline and after the 8-week RET. The data was analysed in SPSS 25.0.

**Results:** The results regarding quality of life, it was seen that in PCOS the domains of quality of life that improved significantly from baseline, week 0 to week 8 were found to be functional status (baseline M±SD, 87.23 ± 13.27; week 8 M±SD, 91.64 ± 12.13), physical aspects (baseline M±SD, 76.24 ± 28.12; week 8 M±SD, 84.03 ± 28.38), pain (baseline M±SD, 67.13 ± 24.16; week 8 M±SD, 75.12 ± 21.31) and energy (baseline M±SD, 60.01 ± 16.78; week 8 M±SD, 64.52 ± 20.22) p value < 0.05, while to rest of domain did not improve including emotional, social, mental and general health status. (p value > 0.05). The results regarding quality of life, it was seen that in control group the domains of quality of life that improved significantly from baseline, week 0 to week 8 were found to be social aspects (baseline M±SD, 74.81 ± 25.34; week 8 M±SD, 84.21 ± 15.1), energy (baseline M±SD, 66.12 ± 20.13; week 8 M±SD, 75.41 ± 21.12) and mental health (baseline M±SD, 69.3 ± 21.34; week 8 M±SD, 78.14 ± 13.87) p value < 0.05, while to rest of domain did not improve including emotional, social, mental and general health status. (p value > 0.05).

**Conclusion:** It was concluded based on the findings from an eight-week trial that women with PCOS benefited from resistance exercise training program various SF-36 quality of life domains including function, physical aspects, pain, and energy while the control group benefited from exercise in domains related to psychological wellbeing such as emotional function, energy, and socialization. Resistance exercise training can be employed as effective therapeutic remedy for improving quality of life in women health issues such as PCOS. On the other hand, exercise is equally effective in women without any health issue and help boost quality of life in psychosocial aspects.

**Keywords:** Quality of Life, Polycystic Ovarian Syndrome, Healthy Women, Resistance Exercise Training

## INTRODUCTION

Polycystic ovarian syndrome (PCOS) affects between 5% and 10% of women of reproductive age. Acanthosis nigricans is frequent in women with PCOS and increases the risk of insulin resistance. 80 to 85 percent of people with PCOS experience hyper androgenetic symptoms such as obesity, hirsutism, acne, alopecia, seborrhea, and virilization.(1, 2) These clinical symptoms may be detrimental to a person's self-esteem and quality of life (QoL). Patients' poor quality of life and mental health are prevalent reasons for their poor quality of life and mental health. Lifestyle changes are thought to be the first non-pharmacological treatment option for PCOS in obese women. Large lifestyle modifications and rapid weight reduction, on the other hand, are unlikely to be sustained; the most successful method for weight loss maintenance is modest and consistent weight loss.(3, 4) Participating in more social activities also leads to improved physical, mental, and social health, which enhances the overall quality of life. Physical activity is most important for the mental health of women with PCOS since it has been related to lower levels of depression in these individuals.(5, 6) A controlled study compared the effects of 20 weeks of dietary restriction alone, dietary restriction and aerobic exercise, or dietary restriction and combined aerobic-resistance exercise on overweight and obese women with PCOS. The study found that both dietary restriction alone and dietary restriction combined with

exercise had similar effects on depression and quality of life.(7, 8) This study's subjects were either overweight or obese. Furthermore, resistance exercise improves insulin sensitivity, promotes a drop in cholesterol levels, lowers blood pressure, and improves glucose metabolism in women with PCOS.(9) All of these advantages stem from an overall enhancement in the body's glucose processing capacity. Regular physical activity provides significant benefits for women with polycystic ovary syndrome (PCOS), including lean mass retention, which is crucial for weight loss promotion, and an increase in basal metabolism. Hence, regular physical activity is advantageous for these women.(10, 11) The objective of this study was to determine how resistance exercise training (RET) influenced the quality of life of people with polycystic ovarian syndrome (PCOS).

## MATERIAL AND METHODS

This was a non-randomized 8-week clinical trial, conducted from July 2021 to January 2022, in community women of reproductive age 18 to 45 taken as controls and women having PCOS enrolled at Link Medical Centre, Lahore. The inclusion criteria were women having polycystic ovarian syndrome, diagnosed using the Rotterdam Consensus, having amenorrhea or oligomenorrhea, biochemical and/or clinical evidence of polycystic ovaries or hyperandrogenism found by pelvic ultrasonography. While the

exclusion criteria were women having genetical hyperprolactinemia, adrenal hyperplasia and thyroid dysfunction, the women in the control group were having normal cycle of menstruation and were recruited from Lahore through flyers and pamphlets. All women enrolled had a body mass index of between 18 and 40 kg/m<sup>2</sup> and were not doing any exercise on a regular basis. pregnant Women and women with systemic diseases that may preclude exercise, or regular smokers, were excluded. Each woman gave her informed permission. A total of 410 women were approached and briefed regarding the research objectives. A total of 166 women fulfilled inclusion requirements; 23 didn't participate owing to schedule issues, professional responsibilities, or routines of hormonal therapy. A total of 143 women completed the first questionnaire and had a clinical examination. Eighteen women didn't finish due to pregnancy or missing more than four sessions. The research analysed 79 PCOS women and 64 non-PCOS women (controls). PCOS and control groups were tested at baseline and after the 8-week RET. Women were examined for fasting blood sugar after a 12-hour fast. The laboratory tests also included testing of anabolic hormones, testosterone, insulin, blood pressure, body mass index based on weight in Kilograms to height in meter square, waist circumference, and transvaginal ultrasound The Physical Activity Readiness Questionnaire (PAR-Q), which checks for problems that prevent physical activity, was completed by the women after these treatments. The women then completed a 36-item short form health survey (SF-36). The ladies first picked up and modified resistance exercises that had been previously published. Six 50-minute adaptation sessions, or three sets of 10 repetitions of each exercise, over the course of two weeks. To determine each patient's training load, a 1-repetition maximum (1-

RM) test was performed over the course of two days, with four exercises per day and a 48-hour rest in between. Bench press for the trunk, flexion chair for the lower limb, and barbell curl (upper extremity). The starting overload for the 1-RM would be 60 kg if someone performed 3 sets of 10 repetitions with 30 kg. After stretching, there were 8 repetitions of the same load used during adaptation and 3 repetitions of an overload that was 10% higher, spaced out at 1-minute intervals. The load was gradually increased by 10% for each exercise until the lady could lift the maximum weight. Between each 1-RM, there was a 3-minute rest period. 24 Each woman's training load was determined after the last 1-RM test, and the RET started the next session. Exercise compliance was tracked by instructors in logs.

## RESULTS

The results regarding characteristics related to demographic, anthropometric and hormonal profile at baseline showed that there was significant difference in age (PCOS M, SD, 30.57 ± 5.79; Control M, SD, 28.7 ± 5.43, p value 0.09), weight (PCOS M, SD 78.63 ± 13.6; Control M, SD 68.13 ± 13.72, p value 0.031 and BMI (PCOS M, SD 27.73 ± 5.61; Control M, SD 23.79 ± 4.89, p value 0.07, which was directly related to significant difference in waist circumference, cm (PCOS M, SD 81.46 ± 10.83; Control M, SD 76.33 ± 11.16, p value 0.043) while the testosterone, androstenedione and insulin were significantly higher in PCOS group as compared to control. Sugar levels were similar in both groups, without a significant difference (PCOS M, SD 98.44 ± 16.84; Control M, SD 96.1 ± 16.65, P value 0.56).

Table 1:

Variable	PCOS (N = 43)	Control (N = 51)	P Value
	Mean ± SD (range)	Mean ± SD (range)	
Age (years)	30.57 ± 5.79	28.7 ± 5.43	0.093
Height (m)	1.64 ± 0.07	1.63 ± 0.04	0.548
Weight (kg)	78.63 ± 13.6	68.13 ± 13.72	0.031
BMI (kg/m <sup>2</sup> )	27.73 ± 5.61	23.79 ± 4.89	0.078
Waist circumference (cm)	81.46 ± 10.83	76.33 ± 11.16	0.043
Glucose (mmol/L)	98.44 ± 16.84	96.1 ± 16.65	0.561
Insulin (mU/L)	8.43 ± 5.06	5.4 ± 3.51	0.036
Testosterone (ng/dL)	89.23 ± 35.74	74.83 ± 31.6	0.035
Androstenedione (ng/mL)	122.4 ± 54.32	97.68 ± 32.67	0.043

Table 2:

Quality of Life Domains	PCOS		P Value	Control		P Value
	Baseline	Week 8		Baseline	Week 8	
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Functional Status	87.23 ± 13.27	91.64 ± 12.13	0.02	88.27 ± 14.11	90.27 ± 11.82	0.101
Physical Areas	76.24 ± 28.12	84.03 ± 28.38	0.08	78.03 ± 32.14	80.12 ± 25.13	0.752
Emotional Areas	72.64 ± 32.78	74.34 ± 27.34	0.90	69.39 ± 39.13	80.13 ± 27.96	0.061
Pain	67.13 ± 24.16	75.12 ± 21.31	0.07	68.12 ± 20.57	71.23 ± 25.28	0.341
Social Aspects	76.32 ± 21.62	81.37 ± 17.17	0.26	74.81 ± 25.34	84.21 ± 15.13	0.013
Energy	60.01 ± 16.78	64.52 ± 20.22	0.08	66.12 ± 20.13	75.41 ± 21.12	0.001
Mental Health	69.12 ± 22.45	72.84 ± 18.57	0.26	69.3 ± 21.34	78.14 ± 13.87	0.001
General Health Status	58.52 ± 16.78	63.13 ± 21.75	0.27	71.23 ± 21.17	74.37 ± 17.86	0.378

The results regarding quality of life, it was seen that in PCOS the domains of quality of life that improved significantly from baseline, week 0 to week 8 were found to be functional status (baseline M±SD, 87.23 ± 13.27; week 8 M±SD, 91.64 ± 12.13), physical aspects (baseline M±SD, 76.24 ± 28.12; week 8 M±SD, 84.03 ± 28.38), pain (baseline M±SD, 67.13 ± 24.16; week 8 M±SD, 75.12 ± 21.31) and energy (baseline M±SD, 60.01 ± 16.78; week 8 M±SD, 64.52 ± 20.22) p value < 0.05, while to rest of domain did not improve including emotional, social, mental and general health status. (p value > 0.05). The results regarding quality of life, it was seen that in control group the domains of quality of life that improved significantly from baseline, week 0 to week 8 were found to be social aspects (baseline M±SD, 74.81 ± 25.34; week 8 M±SD, 84.21 ± 15.13), energy (baseline M±SD, 66.12 ± 20.13; week 8 M±SD, 75.41 ± 21.12) and mental health

(baseline M±SD, 69.3 ± 21.34; week 8 M±SD, 78.14 ± 13.87) p value < 0.05, while to rest of domain did not improve including emotional, social, mental and general health status. (p value > 0.05).

## DISCUSSION

After 8 weeks of resistance exercise training, PCOS women's SF-36 function, pain, and physical aspects improved, while energy, social characteristics, and mental health improved in the control group. Patients with PCOS had higher baseline testosterone and androstenedione levels. In PCOS patients, resistance exercise training decreased testosterone while increasing androstenedione. According to other researchers, inactive women had higher testosterone levels than active women. In the study, both the PCOS and control groups had lower testosterone levels. High-

intensity exercise increases testosterone levels. Other studies have found that RET reduces adrenoceptor levels in some muscles.(12, 13) This demonstrates different endocrine responses to various types of exercise and muscle fibre. An increase in androgen receptors may explain the drop in testosterone after an 8-week RET in this study. This is determined by the duration of the exercise and the amount of fat lost. Insulin resistance was not measured by RET. Insulin levels at rest were normal. 8-week RET increased androstenedione in PCOS patients. There were no studies that measured androstenedione after RET, but one did find an increase after aerobic exercise. The PCOS group's waist circumference decreased from week 0 to week 8, indicating visceral fat loss. Aromatase converts visceral fat into sex steroids.(14, 15)The reduction of visceral fat may have reduced aromatase while increasing androstenedione. RET has been shown in studies to reduce the waist circumference of PCOS patients. RET improves the quality of life. All SF-36 dimensions improved for PCOS, but only functional capacity improved significantly. Functional capacity is measured daily. Other studies looked at the effect of exercise on QoL in different groups. Aerobic exercise improved the flexibility, strength, cardiorespiratory function, vitality, and mental and emotional health of fibromyalgia patients. Another study discovered that exercise improved the functional ability and health perception of PCOS women. It is unknown how RET affects the QoL of PCOS women.(16, 17) The current RET programme includes exercises that are controlled and managed by physical educators and are completed three times per week with a customised resistance load. According to research, a guided RET programme may improve the functional capacity of PCOS patients. The vitality of the PCOS group improved slightly. Week 8 increased the vitality of the control group. Aerobic exercise, either alone or in combination with RET, is also beneficial, but no studies have shown that it increases vitality in PCOS women. Patients with diabetes benefit from RET and cardio. This could be as a result of paired patient training under expert supervision. A study discovered that supervised training increases fitness programme adherence. Except for social factors, the majority of SF-36 categories had no relationship with testosterone in PCOS. The testosterone levels and SF-36 social domains of PCOS women are unknown. All SF-36 classifications improve physical function, social function, energy, psychological health, social function, and emotional function, implying that hormones play a role. Lowering testosterone levels may boost PCOS women's self-esteem by improving "social aspects," a high-quality-of-life factor for women, it was also evaluated in females with comorbid neurogenic origin.(18-20) The social domain of the PCOS group did not improve after RET. comparable mental health outcomes Prior research with PCOS women found that various physical exercise protocols improved these domains, but no previous research with PCOS women used the current programme. Both times, the control group was healthier than the PCOS group. Women with PCOS had lower QoL ratings than the general population in general health, energy, mental health, and social aspects. PCOS has an impact on women's social lives. These therapies reduced waist circumference and increased functional ability in women, which may have improved QoL and sexual function. According to research, BMI and waist size have an impact on the quality of life of PCOS patients. The lack of a control group and the study design made it impossible to determine whether exercise cessation caused metabolic, hormonal, or QoL changes. Exercise improves PCOS women's metabolic and anthropometric traits, allowing them to restart ovulation. Working to improve women's anthropometrics improves their quality of life.(21, 22)

## CONCLUSION

It was concluded based on the findings from an eight-week trial that women with PCOS benefited from resistance exercise training program various SF-36 quality of life domains including function, physical aspects, pain and energy while the control group

benefited from exercise in domains related to psychological wellbeing such as emotional function, energy and socialization. Resistance exercise training can be employed as effective therapeutic remedy for improving quality of life in women health issues such as PCOS. On the other hand, exercise is equally effective in women without any health issue and help boost quality of life in psychosocial aspects.

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