



Original Article

Effects Of Resistance Exercise on Lipid Profile and Body Mass Index in Women with Poly Cystic Ovary Syndrome

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ABSTRACT

Poly Cystic Ovary Syndrome (PCOS) is one of the most common disorders in women at reproductive age. It is commonly associated with infertility, increase in body weight changing in lipid profile and other hormonal levels. Different type of resistance exercise therapy reduces the symptoms of PCOS so physical activity is consider first line therapy for PCOS. Resistance exercises help to reduce total body weight, it helps to regulate the menstrual cycle. Women with PCOS have high levels of total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL), NON-High density lipoprotein (NON-HDL), and low level of HDL but resistance training help to normalize the ranges of lipid profile and reduce BMI. **Objective:** To determine the effects of resistance exercise on lipid profile and BMI in patients with PCOS and improvement in lipid profile and BMI in women with PCOS. **Method:** It was a quasi-experimental study. Total sample of 28 women with PCOS and abnormal ranges of lipid profile was taken. This study was conducted for 12 weeks. Before starting the resistance training, we took lipid profile lab test and BMI values then after completing the resistance training of 12 weeks again took lipid profile lab test and BMI of patients. **Results:** Findings revealed that there was significant difference in values of lipid profile and BMI before and after resistance therapy. Lipid profile and BMI reading showed $p < 0.05$ when compared both reading by using Wilcoxon rank test. The p value of all variables is < 0.05 so we can say that resistance exercise help to reducing total cholesterol, low density lipoprotein, triglycerides, non-high-density lipoprotein, and BMI and increase the high-density lipoprotein. **Conclusion:** This study concludes that there is a significant difference in lipid profile and BMI in women with PCOS after taking 12 weeks of resistance therapy.

INTRODUCTION

Polycystic ovary syndrome (PCOS) is a common female endocrine disease. It has been linked with many other reproductive and metabolic illness but in long term management through exercises and weight loss play important role exercises help to improve lipid profile, regulate fertility and risk of other hormonal diseases [1]. In women with PCOS, have many hormonal issues, abnormal lipid profile and high BMI but if these women have active life style daily exercises low down BMI, lipid profile and other hormonal levels [2]. PCOS is a problematic "endocrinopathy" that effects the hormonal level in women of childbearing age [3]. It is related with other pathologies like insulin resistance (IR), hypertension, obesity, diabetes militias, depression, anxiety, cardiovascular, reproductive

dysfunctions the symptoms of PCOS are production of high number of male hormones in women and it cause menstrual irregularity, infertility, and pregnancy complications [4]. The symptoms of PCOS are irregular periods, acne, and infertility, increasing weight, hair fall, baldness, and complication during pregnancy. Women with "PCOS" also have insulin resistance (IR) that is dependent on body mass index that's why it is also called metabolic disorders in this disorder, resistance exercise effect and restore the symptoms and helps to maintain the BMI. Resistance exercises are the type of exercise training in which body move opposite side of direction where power is applied. In this type of training use different weight bearing exercises equipment's. Resistance exercise are beneficial

for musculoskeletal system it also improves insulin resistance, metabolism, BMI, fat compositions in women with PCOS [5]. Lifestyle changing and exercises are considered first line therapy in PCOS. Exercise is an important element to improve reproductive system in PCOS. PCOS is a metabolic disorder that's why exercise help in improve the symptoms of PCOS, decreasing BMI, body fat hip ratio, lipid metabolism, decreasing stress and stress hormone, increasing pregnancy rate and restoring menstrual cycle leading to all other symptoms[6]. Exercise has positive effect on visceral fat but have no effect in body mass index. But in few women, it changes in BMI. Resistance exercise also effect in fasting glucose levels, insulin resistance and other hormone and cholesterol levels in fasting lipid profile[7]. The women with PCOS are overweight that's why they have high BMI values we need height and weight values to calculate the BMI[8]. In female with PCOS have a high chance CVD. It causes increasing in values of lipid profiles like dyslipidemia, lipoproteins. LDL-C. TGs and low quality of HDL-C [9]. The Lipid profile and insulin resistance are reduced from different resistance exercises in women with PCOS it also changes in body mass index. the exercises show low ranges of (total cholesterol (TC), triglyceride (TG), low- density lipoprotein (LDL-C) and glucose concentration)[10]. Obese and non-obese women with PCOS have abnormal ranges of lipid profile high level of (total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL-C) and low level of high density of lipoprotein(HDL-C)[11].

METHODS

The study was conducted at Al Mustafa Maternity hospital Lahore. Samples were collected by using inclusion and exclusion criteria. A total of 28 samples were collected in this study. There was only one group of women with PCOS in this study. Before giving the exercise protocol lipid profile and BMI readings were taken in the 1st week after completing the therapy of 12 weeks again readings were taken at the end of 12th week .Data were by Online BMI calculator and Lipid profile lab test

Online BODY MASS INDEX (BMI) Calculator: This was used to check BMI before and after treatment in patients who had PCOS. These ranges of BMI vary based on age, total body weight and height. Being overweight or underweight can have different health issues. Refer to the table 1 to see the different ranges of BMI that is measured by online "calculator"[12].

BMI Ranges:	
Underweight range	=<18.5
Normal weight range	= 18.5–24.9
Overweight range	= 25–29.9
Obesity range	= 30 or >30

Table 1: BMI ranges

Lipid profile Lab Test: This test was done before and after the resistance exercise in women with PCOS. If the test is drawn as part of a total lipid profile (LP), it requires 12 hours fasting (no food or drink, except water) . A typical LP includes the following tests: Total cholesterol: High density lipoprotein cholesterol, (HDL-C) - "good cholesterol", Low density lipoprotein cholesterol, (LDL-C) -"bad cholesterol", Triglycerides and Non-HDL Cholesterol. Three session of treatment per week was given and home-based exercise also prescribe. After completing 12 weeks of session again measured Post treatment values of lipid profile and BMI.SPSS for windows software, version 25 was used to analyze the data using statistical significance "p=0.05".

RESULTS

The results show that there is a difference in mean and standard deviation (SD) of total cholesterol, BMI, HDL, LDL and non-HDL. As, we have only one group so we applied Wilcoxon Signed Ranks Test to check the statistical difference and before applied that test, we checked the normality of data by applying Shapiro Wilk test which shows that data was not normally distributed (Table 2). The statistical results gave us the p-value which is below the 0.05 of all the variables which tells us that our null hypothesis is rejected and we can say that resistance exercise can have a effects on decreasing BMI, total cholesterol, low density lipoprotein (LDL-C), triglyceride (TG), non -high density lipoprotein (NON-HDL) and increasing high density lipoprotein(HDL-C)(Table 2).

Variables	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	DF	p-value	Statistic	DF	P-value
Marital Status	.465	28	.000	.541	28	.000
Age of Patient	.107	28	.200*	.957	28	.288
Occupation	.312	28	.000	.757	28	.000
Body Mass Index Before	.411	28	.000	.608	28	.000
Total Cholesterol Before	.216	28	.002	.810	28	.000
HDL-Cholesterol Before	.465	28	.000	.541	28	.000
LDL-Cholesterol Before	.206	28	.004	.907	28	.017
Triglyceride Before	.233	28	.000	.813	28	.000
Non-HDL Cholesterol Before	.219	28	.001	.875	28	.003
Body Mass Index After	.411	28	.000	.608	28	.000
HDL-Cholesterol After	.539	28	.000	.188	28	.000
LDL-Cholesterol After	.536	28	.000	.287	28	.000
Triglyceride After	.539	28	.000	.188	28	.000
Non-HDL Cholesterol After	.530	28	.000	.286	28	.000

Table 2: Tests of Normality

Total cholesterol	Frequency	Percentage	Mean ± SD
Desirable (<200)	7	25%	2.071±0.766
Borderline (200-239)	12	42.9%	
High (>240)	9	32.1%	
Total	28	100%	

Table 3: Total Cholesterol Before therapy

Total cholesterol	Frequency	Percentage	Mean ± SD
Desirable (<200)	28	100%	1.000±0.000
Borderline (200-239)	0	0%	
High (>240)	0	0%	
Total	28	100%	

Table 4: Total Cholesterol after therapy

HDL-C BEFORE and After: Statistics of Total Cholesterol Before and after therapy. This table show Desirable 25%, Borderline 42.9%, High 32.1% levels of TC before therapy and mean stander deviation is (Mean ± SD) 2.071±0.766 and another table show 100% desirable levels of total cholesterol after therapy and mean, and stander deviation is (Mean ± SD) 1.000±0.000 (Table 3,4). Statistics of total HDL before and after therapy. This table show low 25% normal 75 % HDL before therapy and mean a standard deviation before therapy is (Mean ± SD) 1.750±0.440 This table show low (1) 3.6%, normal (27) 96.4% HDL after therapy LDL-Before and After (Table 5). Statistics of total LDL before therapy. This table shows Desirable (2)7.1% above desirable (3)10.7%, borderline (11)39.3%, High (8)28.6% Very High (4)14.3% LDL before therapy and mean and stander deviation is (Mean ± SD) 3.321±1.090 (Table 6).

LDL-C AFTER: Statistics of LDL after therapy. Desirable (26) 92.9%, above desirable (3)7.1%, Borderline (2)39.3% after therapy and mean and stander deviation is (Mean ± SD) 1.142±0.524.

Variables	N	Mean	SD	Minimum	Maximum
Body Mass Index Before	28	2.6429	.48795	2.00	3.00
Total Cholesterol Before	28	2.0714	.76636	1.00	3.00
HDL-Cholesterol Before	28	1.7500	.44096	1.00	2.00
LDL-Cholesterol Before	28	3.3214	1.09048	1.00	5.00
Triglyceride Before	28	2.0357	.74447	1.00	3.00
Non-HDL Cholesterol Before	28	3.3571	1.25357	1.00	5.00
Body Mass Index After	28	2.3571	.48795	2.00	3.00
Total Cholesterol After	28	1.0000	.00000	1.00	1.00
HDL-Cholesterol After	28	1.9643	.18898	1.00	2.00
LDL-Cholesterol After	28	1.1429	.52453	1.00	3.00
Triglyceride After	28	1.0357	.18898	1.00	2.00
Non-HDL Cholesterol After	28	1.1071	.41627	1.00	3.00

Table 5: Descriptive statistics

LDL	Frequency	Percentage	Mean ± SD
Desirable (<99)	2	7.1%	3.321±1.090
Above desirable (100-129)	3	10.7%	
Borderline (130-159)	11	39.3%	
High (160-189)	8	28.6%	
Very High (>190)	4	14.3%	
Total	28	100%	

Table 6: Statistics after applying Wilcoxon test

This table 6 show that after applying Wilcoxon rank test mean and stander deviation values of all variables. This table show the comparison of mean and stander deviation values of before and after resistance training

DISCUSSION

A Particular goal of this study was to ensure that the resistance exercise is helping to decreasing the values of lipid profile or BMI in women with PCOS. Abnormal Lipid profile values and BMI are common among women with PCOS. The current study shows that there are significant changes in lipid profile and BMI values with $p < 0.05$ while comparing lipid profile and BMI values before and after treatment over a period of 12 weeks. Moreover, significant changes were seen over 12 weeks in all variables when analyses were done Mean ranks of all variables were higher in before therapy as compared to after therapy. The significant findings of this study show the mean and standard deviation of all variables are changed after therapy. The P vale of all variables are less than <0.05 which show that resistance exercise helps the women with PCOS in reducing weight, BMI, TC, TG, non- HDL and increasing in HDL-C after taking 12 weeks of resistance training. In 2021 Xia Wu conducted study about effect of exercise training in women with PCOS, they record the significant changing in BMI over a period of 12 weeks [14]. Victor B conducted a study which showed beneficial changes in TC ($P \leq .001$), LDL ($P = .030$) and total body mass ($P = .015$) over the exercise therapy of 16 weeks in women with PCOS [15]. In current study we also noted the significant difference in these variables with the p values <0.005 . In a study conducted in 2019, it was observed that after resistance training hormonal levels and BMI are normal in exercise group. They started resistance training for 6 weeks (3 session per week) after completing the training they compared pre and post results of hormonal levels and BMI. It showed significant improvement with p value <0.005 women with PCOS [16]. Akbar and colleagues conducted a study in 2017 in which they performed resistance exercise to one group for 8 weeks three session per week and it show changes in lipid profile and show the significance increasing the value of HDL ($P=0.039$) [17]. In current study, similar improvement of lipid profile was noted in addition to 96.4% women increasing the HDL with p value <0.014 after completing the exercise therapy of 12 weeks. Pamala J studied in 2021 that resistance training give beneficial effects on body weight of women with PCOS A loss of 5 to 10 % of total body weight

was observed and it also improved total cholesterol levels and triglyceride [18]. Now in current study we also see women loss 3 to 4 kg s total body weight and helped in decreasing BMI. Resistance exercise also helped to improved cholesterol levels with (Mean \pm SD)1.000 \pm 0.000 and p value is <0.05. KOGURE, G studied that progressive resistance training effect on body compositions, hormonal level waist circumference lean body mass and reducing visceral fat but no significance difference on BMI [7]. All factor of this study agree to current study but disagree in decreasing BMI values because in current study it's also show significance effect on BMI. Richard J. Kirk and other members find in their study that exercise training help to reduce body weight and improving in body composition after taking therapy of 8 weeks. In their study they recommended resistance training to one group after completing the therapy they compared the pre and post BMI ranges and it showed significant change on BMI in women with PCOS. The p value is <0.05 of BMI after completing therapy [19]. This study agree to current research where we also found a significant difference on BMI and other body composition in women with PCOS after completing therapy. Maryam Najaf study that 8 weeks of resistance training helped to increase in HDL-C, decreasing total cholesterol and BMI with p<0.05 in women [20].

CONCLUSIONS

This study is in agreement with the current study where we also observed that the resistance exercise increasing high-density lipoprotein (HDL-C) and decreasing total cholesterol and BMI in females with PCOS.

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