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Original Research Article

Effect of Yoga among Polycystic Ovarian Syndrome Subjects in Comparison to Hormonal Therapy

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Abstract:

Background: PCOS, a medical condition, is characterized by high anti-mullerian hormone levels in women, indicating both infertility and PCOS. This study aims to enhance health outcomes among women aged 16-35 with PCOS by analyzing their socio-demographic profile, evaluating biochemical markers, and identifying effective strategies.

Methods: The study involved Polycystic Ovarian Syndrome (PCOS) patients aged 16-35 years in Lucknow's department of obstetrics and gynecology. Patients were divided into two groups: Group A, who received hormonal therapy, and Group B, who practiced yoga. Group A received oral contraceptive pills for three months, while Group B used the curelink app for 20-minute yoga sessions. Hormonal parameters were measured at baseline and after three months.

Results: The mean age for hormonal therapy was 24.61±3.77 years, while yoga therapy was 26.15±4.37 years. There are no significant differences in marital status, height, weight, or BMI between the two groups. The mean left ovary volume and left ovary follicles before and after treatment showed no significant difference between the two groups. The study found no significant difference in fasting blood sugar, insulin, prolactin, or thyroid stimulating hormone levels between the two groups before or after treatment. However, there was a significant difference in LDL levels before treatment, indicating that the mean levels of Serum FSH, LH, and AMH were similar between the two groups.

Conclusion: The study compared hormone replacement therapy and yoga therapy for improving women's health with PCOS, finding no significant differences. Yoga therapy significantly decreased left ovary volume in hormone therapy group.

Introduction

Polycystic Ovarian Syndrome (PCOS) is an endocrine disorder affecting 5-10% of women during their reproductive years. [1-3] It causes chronically elevated male hormone levels, leading to symptoms like excessive hair growth, acne, irregular menstruation, and infertility. Originating during fetal development, PCOS manifests later in adulthood due to internal and external factors. [4-6]

PCOS is a metabolic disorder causing high levels of luteinizing hormone and pregnancy complications. Modern medicine is expensive, negative, and inaccurate, and hormone therapy is the only option. [6,7] Yoga, an ancient practice, effectively treats PCOS without side effects. PCOS increases the risk of other physical and psychological abnormalities, leading to decreased quality of life and increased healthcare costs.[8]

Yoga can prevent and treat Polycystic Ovarian Syndrome by promoting muscle development, countering insulin resistance, and reducing weight. Dynamic yoga routines elevate heart rate, promote cardiovascular exercise, and aid in weight reduction.[9] Asanas and pranayama techniques regulate hormones, induce relaxation, and aid in chronic inflammation recovery. Poses like Butterfly Pose, Surya Namaskara, Prone asanas, and Reclining Bound Angel Pose reduce stress, promote energy flow, and enhance mobility. [10,11]

Hormonal therapy, including oral contraceptives and anti-androgen medicines, is commonly used to regulate menstrual cycles and stimulate ovulation in women with polycystic ovarian syndrome (PCOS). Clomiphene citrate is the preferred first therapy, but its success rate is unsatisfactory.[12] Human

menopausal gonadotropin (hMG) or pure follicle stimulating hormone (FSH) are alternative methods to stimulate ovulation, but these may lead to multiple pregnancies and ovarian hyperstimulation syndrome (OHSS). There is a need for an oral medicine that can induce ovulation without extensive monitoring and minimal adverse effects on the endometrium. Other medical interventions include intrauterine insemination, in vitro fertilization, gamete intrafallopian transfer, and intracytoplasmic sperm injection. Yoga, an age-old discipline combining physical poses, controlled breathing techniques, and meditation, has been recognized as a promising holistic method for controlling PCOS. [13,14] This study aims to compare yoga and hormonal therapy on PCOS subjects, focusing on menstrual regularity, hormonal profile, insulin sensitivity, and psychological health. The research aims to expand therapeutic options and provide insights into holistic and patient-centered approaches, contributing to the evolving paradigm of PCOS management.

The study aims to improve health outcomes among women aged 16-35 with PCOS by studying their socio-demographic profile, assessing improvements in biochemical markers, assessing changes in sonographic findings, and identifying appropriate strategies for improving health outcomes among PCOS patients.

Methods

This prospective interventional study was conducted at Prasad Medical College and Hospital in Lucknow's department of obstetrics and gynecology. The study was divided into two groups: Group A (hormonal therapy) and Group B (yoga therapy). The patient population was divided into two groups based on age and diagnosis of PCOS. Females who had previously received a PCOS diagnosis but had not started hormone therapy in the previous three months were included. Exclusion criteria included pregnancy and lactating patients, those with other causes of anovulation or oligoovulation, active liver disease, active renal impairment, established Type-1 or Type-2 Diabetes mellitus, history of drug intake in the last three months, smokers, and alcohol addicts.

The study randomized patients to either hormonal therapy (Group A) or yoga therapy (Group B) based on their criteria, and both groups were instructed to make dietary and lifestyle modifications. Group A received oral contraceptive pills for 21 days each month for 3 months, while Group B used the curelink app to facilitate a 20-minute yoga session three times a week. Hormonal parameters were measured at baseline and after three months, including insulin resistance, glucose-insulin ratio, serum testosterone, serum thyroid stimulating hormone, fasting insulin, fasting blood sugar, FSH, LH, and LH/FSH ratio, and insulin resistance parameter. A pelvic ultrasound was performed, and blood lipid profiles were measured. Fasting insulin was measured using a solid phase system enhanced sensitivity immunoassay using reagent kits. Blood glucose was measured using blood samples obtained with or without anticoagulants. Follicle stimulating hormone (FSH) was estimated using a test kit. The procedure involves obtaining the desired number of coated wells by dividing 50 microliters of standard, specimens, and controls into corresponding wells. Then, 100 microliters of enzyme conjugate reagent was added to each well, mixed for 30 seconds, and incubated for 60 minutes at room temperature. After washing the microtiter wells five times with washing buffer, 100 µl of chemiluminescence substrate solutions were added to each well, gently mixed for five seconds, and the chemiluminescence was measured after five minutes. The test kit provided includes an antibody-coated microtiter plate with 96 wells, enzyme conjugate reagent, 20x wash buffer, chemiluminescence reagents A and B. The normal testosterone levels for men are 300–1,000 ng/dL, while for women, they range from 15–70 ng/dL. The typical range for testosterone levels in men aged 19 and above is 240 to 950 nanograms per deciliter (ng/dL). The test kit also provides an estimation of Thyroid Stimulating Hormone (TSH) in blood, which is reported in µIU/ml. Insulin concentration is given as µu/ml. Three test tubes were labeled as 'Blank', 'Standard', and 'Test'. The mixture was then mixed and allowed to cool to room temperature. For color development, a volume of 0.10 ml was transferred from each test tube labeled 'Test' and 'Standard' into separate sets of test tubes. The intensity of a pink hue was quantified using colorimetry at a wavelength of 546nm.

The study to estimate serum triglycerides, VLDL, LDL, and HDL using various methods. Triglycerides were measured using the GPO-PAP technique, and optical density was determined using colorimetric measurements. VLDL, primarily derived from the liver, made up 50% of VLDL composition. LDL cholesterol content was quantified in mg/dL, and HDL was isolated from the supernatant using the SPAN diagnostic kit.

The study utilized Microsoft Excel and SPSS 23 version for data analysis, presenting descriptive statistics in means/standard deviations, medians/IQRs, and frequencies/ percentages for continuous and categorical variables. Data visualization was done using various tools, and group comparisons were made using independent sample 't' test, Wilcoxon test, Chi-squared test, Fisher's Exact test, Pearson's and Spearman's correlation, and statistical significance was maintained at $p<0.05$.

Results

The study found no significant difference in age, marital status, height, weight, or BMI between patients undergoing hormonal therapy and yoga therapy. The mean age was 24.61±3.77 years for hormonal therapy and 26.15±4.37 years for yoga therapy. Marital status was not significantly different between the two groups. Height was similar for both groups, and weight distribution was similar. The data suggests that the initial conditions for both therapeutic approaches are comparable, suggesting that any observed effects are more likely due to the therapies themselves. (Table 1)

Table 1: Comparison of demographic profile and BMI between Hormonal therapy and Yoga therapy

	Hormonal therapy (n=33)			**Yoga therapy (n=33)**		**p-Value**
	Parameters	**No.**	**%**	**No**	**%**	
Age (in years)	16-19 Years	6	18.18	4	12.12	χ^2=1.08
	20-24 Years	10	30.30	8	24.24	0.782
	25-29 Years	10	30.30	13	39.39	
	30-35 Years	7	21.21	8	24.24	
	Mean±SD	24.61±3.77		26.15±4.37		t=-1.53, p=0.130
Marital Status	Married	15	45.45	16	48.48	
	Unmarried	18	54.55	17	51.52	0.805
Height	≤ 150 cm	15	45.45	16	48.48	
	151-160 cm	9	27.27	7	21.21	0.846
	> 160 cm	9	27.27	10	30.30	
Weight	≤50 kg	12	36.36	11	33.33	
	51-65 kg	7	21.21	9	27.27	0.715
	66-80 kg	7	21.21	9	27.27	
	> 80 kg	7	21.21	4	12.12	
Body Mass index	< 18.5 kg/m^2	9	27.27	8	24.24	
	18.5 - 24.9 kg/m^2	15	45.45	14	42.42	0.864
	25 - 29.9 kg/m^2	9	27.27	11	33.33	

The mean serum levels of Follicle Stimulating Hormone (S. FSH), Luteinizing Hormone (S. LH), Anti-Müllerian Hormone (S. AMH), Testosterone, Fasting Blood Sugar, Fasting Insulin, Serum Prolactin, and Serum Thyroid Stimulating Hormone (S. TSH) levels in patients undergoing hormonal therapy and yoga therapy before and after treatment. The mean S. FSH levels were 6.33±2.15 in the hormonal therapy group and 6.61±1.78 in the yoga therapy group before treatment. After treatment, the mean S. FSH levels were 6.40±2.16 in the hormonal therapy group and 6.18±2.02 in the yoga therapy group. No significant difference was found between the two groups, both before and after treatment. The mean S. LH levels were 5.73±2.42 in the hormonal therapy group and 7.47±2.32 in the yoga therapy group before treatment. After treatment, the mean S. LH levels were 6.10±2.05 in the hormonal therapy group and 6.39±2.57 in the yoga therapy group. No significant difference was found between the two groups, both before and after treatment. The mean Anti-Müllerian Hormone (S. AMH) levels were 4.62±1.12 in the hormonal therapy group and 4.61±1.18 in the yoga therapy group before treatment. After treatment, the mean S. AMH levels were 4.34±0.95 in the hormonal therapy group and 3.94±0.81 in the yoga therapy group. The mean S. Testosterone levels were 40.61±7.72 in the hormonal therapy group and 41.82±9.08 in the yoga therapy group before treatment. After treatment, the mean S. Testosterone levels were 38.58±8.36 in the hormonal therapy group and 39.58±8.25 in the yoga therapy group. The mean fasting blood sugar levels were 92.30±9.04 in the hormonal therapy group and 92.27±9.28 in the yoga therapy group before treatment. After treatment, the mean fasting insulin levels were 143.30±20.30 µIU/mL in the hormonal therapy group and 129.67±23.49 µIU/mL in the yoga therapy group. The mean S. Prolactin levels were 18.35±6.39 ng/mL in the hormonal therapy group and 18.64±6.42 ng/mL in the yoga therapy group before treatment. After treatment, the mean S. TSH levels were 3.03±0.93 mIU/L in the hormonal therapy group and 3.08±0.87 mIU/L in the yoga therapy group, indicating no significant difference between the two groups. (Table 2)

Table 3: Comparison of mean S. FSH, S. LH, S. AMH, mean S. Testosterone, mean Fasting blood sugar, Fasting insulin, S. Prolactin between Hormonal therapy and Yoga therapy at before and after Treatment

	Hormonal therapy (n=33)	Yoga therapy (n=33)	t	p-Value
S.FSH	**Mean±SD**	**Mean±SD**		
Before Treatment	6.33±2.15	6.61±1.78	-0.57	0.568
After Treatment	6.40±2.16	6.18±2.02	0.44	0.665
S. LH				
Before Treatment	5.73±2.42	7.47±2.32	-2.03	0.147
After Treatment	6.10±2.05	6.39±2.57	-0.52	0.608
S. AMH				
Before Treatment	4.62±1.12	4.61±1.18	0.06	0.956
After Treatment	4.34±0.95	3.94±0.81	1.82	0.073
S. Testosterone				
Before Treatment	40.61±7.72	41.82±9.08	0.58	0.562
After Treatment	38.58±8.36	39.58±8.25	4.89	0.626
Fasting blood sugar				
Before Treatment	92.30±9.04	92.27±9.28	0.01	0.989
After Treatment	93.09±7.17	90.55±8.09	1.35	0.181
Fasting insulin				
Before Treatment	136.64±29.66	129.42±29.77	0.99	0.328
After Treatment	143.30±20.30	129.67±23.49	2.52	0.014
S. Prolactin				
Before Treatment	18.35±6.39	18.64±6.42	-0.18	0.855
After Treatment	16.84±4.96	17.32±4.17	-0.43	0.670
S. TSH				
Before Treatment	3.10±1.00	3.22±0.93	-0.49	0.626
After Treatment	3.03±0.93	3.08±0.87	-0.20	0.840

The study compared the mean S. Cholesterol, S. Triglyceride, HDL, and LDL levels before and after hormonal therapy and yoga therapy. The results showed no significant differences in these parameters before or after treatment, except for a significant difference in LDL levels before treatment. The mean values for S. Cholesterol were 155.65 ± 28.18 mg/dL before treatment, and 169.18 ± 29.95 mg/dL for hormonal therapy and 169.64 ± 28.17 mg/dL for yoga therapy. For S. Triglyceride, the mean was 111.47 ± 35.49 mg/dL before treatment and 124.86 ± 21.61 mg/dL before and after treatment. The mean values for HDL were 48.56 ± 14.45 mg/dL before and 59.45 ± 15.75 mg/dL for hormonal therapy and 56.82 ± 13.59 mg/dL for yoga therapy. For LDL, the mean was 94.45 ± 35.23 mg/dL before treatment and 111.96 ± 24.64 mg/dL before and after treatment. The data suggests that both therapies had generally similar effects on these lipid profile parameters, except for a significant difference in LDL levels before treatment. This indicates that both therapies had generally similar effects on these lipid profile parameters based on the provided data. (Table 3)

Table 3: Comparison of mean S. Cholesterol, S. Triglyceride, HDL, and LDL between Hormonal therapy and Yoga therapy

		Hormonal therapy (n=33)		Yoga therapy (n=33)		t	p-Value
		Mean	**±SD**	**Mean**	**±SD**		
S. Cholesterol	Before Treatment	155.65	28.18	163.85	34.62	-1.06	0.295
	After Treatment	169.18	29.95	169.64	28.17	-0.06	0.950
S. Triglyceride	Before Treatment	111.47	35.49	124.86	21.61	-1.85	0.069
	After Treatment	130.27	17.48	130.00	17.00	0.06	0.949
HDL	Before Treatment	48.56	14.45	50.55	15.32	-0.54	0.589
	After Treatment	59.45	15.75	56.82	13.59	0.73	0.469
LDL	Before Treatment	94.45	35.23	111.96	24.64	-2.34	0.022
	After Treatment	117.48	12.71	115.09	18.59	0.61	0.544

The study compared the mean Rt Ovary volume (cc) and Rt ovary follicle between hormonal therapy and yoga therapy. Before treatment, the hormonal therapy group had a mean of 15.84 ± 4.34 cc, while yoga therapy had 14.61 ± 4.91 cc. After treatment, the mean values were 8.39 ± 2.37 cc for hormonal therapy and 9.39 ± 3.51 cc for yoga therapy. The data suggests no significant differences in right

ovary volume or right ovary follicle count between hormonal therapy and yoga therapy groups before or after treatment. However, there was a marginal non-significant difference in right ovary follicle count before treatment. Both therapies had generally similar effects on these ovarian parameters. Left ovary volume showed no significant difference before treatment, with hormonal therapy potentially leading to a greater reduction in volume compared to yoga therapy after treatment. However, there were no significant differences in left ovary follicle count between hormonal therapy and yoga therapy groups before or after treatment. Both hormonal therapy and yoga therapy had generally similar effects on these ovarian parameters. However, there was a marginal non-significant difference in left ovary volume before treatment, with hormonal therapy potentially leading to a greater reduction in volume compared to yoga therapy after treatment. (Table 4)

Table 4: Comparison of mean Rt Ovary volume (cc) and Rt ovary follicle, Left ovary volume and Left ovary follicle between Hormonal therapy and Yoga therapy

		Hormonal therapy (n=33)	Yoga therapy (n=33)	t	p-Value
		Mean±SD	Mean±SD		
Rt Ovary volume (cc)	Before Treatment	15.84±4.34	14.61±4.91	1.08	0.285
	After Treatment	8.39±2.37	9.39±3.51	-1.36	0.180
Rt ovary follicle	Before Treatment	13.76±3.43	12.27±3.01	1.88	0.065
	After Treatment	6.94±2.41	7.30±2.52	-0.60	0.551
Left ovary volume	Before Treatment	17.19±3.37	15.58±4.22	1.72	0.091
	After Treatment	14.33±2.84	12.58±2.87	2.50	0.015
Left ovary follicle	Before Treatment	9.21±2.86	9.52±2.50	0.648	0.648
	After Treatment	7.55±2.22	7.36±2.25	0.33	0.742

Discussion

Polycystic ovarian syndrome (PCOS) is a condition causing hormonal imbalances, irregular menstrual periods, and environmental issues, with first-line therapies like metformin and clomiphene citrate having limitations. [15,16]

Yoga, an ancient Indian practice, has been identified as a potential alternative therapy for women with PCOS. It combines physical postures, breathing exercises, and meditation techniques, improving overall well-being, hormonal equilibrium, and psychological welfare without the side effects of conventional hormone treatments.[17] Total 66 participants were divided into two groups: one received hormone treatment, while the other received yoga therapy. Anthropometric measurements were taken before and after yoga practice, and biochemical tests were conducted to measure various hormones. An ultrasound scan was used to measure endometrium thickness and follicle size. The study found no significant difference in age distribution between the two groups. In hormone therapy, the age distribution was higher, with 18.18% of participants aged 16-19 years, while in yoga therapy, it was 12.12% and 24.24% aged 20-24 years. The average age for hormone therapy was 24.61±3.77 years, while the average age for yoga therapy was 26.15±4.37 years.

A study assessing PCOS risk in adolescent females found no significant difference in BMI distribution between hormone treatment and yoga therapy groups, highlighting the importance of early risk assessment.[18] The research focused on menstrual cycle, nutritional behavior, excessive hair growth, harmful food intake, and psychological characteristics like depression and stress. In the context of hormone treatment, 27.27% of individuals had a BMI below 18.5 kg/m², while 45.45% had a BMI ranging from 18.5 to 24.9 kg/m². In yoga treatment, 24.24% had a BMI below 18.5 kg/m², 42.42% between 18.5-24.9 kg/m², and 33.33% between 25-29.9 kg/m².

Polycystic ovarian syndrome (PCOS) is a condition characterized by irregular menstrual cycles, negative mood, a family history of diabetes, and insufficient physical exercise. Risk factors include obesity, central obesity, and insulin resistance. Treatment aims to reduce these factors, with short-term weight reduction and yoga being effective methods. Studies show a reduction in tri-glycerides, luteinizing hormone ratio, and sex hormone-binding globulin levels.[9] However, current research lacks laboratory testing to assess the intervention's impact.[19]

The study found no significant difference in mean serum FSH levels between hormone therapy and yoga therapy groups before and after treatment. Both groups had elevated mean FSH levels, indicating PCOS, which is characterized by ovarian dysfunction. Hormonal therapies, such as oral contraceptives, regulate the hypothalamic-pituitary-ovarian axis to normalize hormonal abnormalities. [16,20] Yoga treatment significantly reduced serum FSH levels through postures, breathing exercises, and meditation, enhancing endocrine function and stress. Both treatments suggest endocrine disorders can be treated pharmacologically with hormone

treatments, indirectly affecting physical and mental well-being. [9,66,72]

The study found no significant difference in mean serum LH levels between hormone therapy and yoga therapy groups before and after treatment. Hormone therapy significantly lowers average LH levels, while yoga treatment also reduces them. Hormone therapy can normalize LH levels by inhibiting pituitary gonadotropin production. [66,67] Yoga, on the other hand, can indirectly lower LH production by reducing stress and improving physical and mental health, while hormone treatment directly suppresses LH production. [18,21]

Fruzzetti et al (2000) found a decrease in LH levels in 10 participants, possibly due to drugs reducing insulin and androgen levels. However, yoga treatment restored endocrine profiles in PCOS patients, as yoga regulates hormone levels and affects endometrial walls, restoring normal endocrine function.[22]

Yoga and hormone therapy have been shown to reduce the average serum LH level in PCOS patients, with no significant difference in mean serum AMH levels before and after treatment. Hormonal treatments, such as oral contraceptives, can balance the hormonal environment and lower AMH levels by reducing tiny antral follicles. Yoga, which includes physical postures, breathing exercises, and meditation, can reduce stress and improve endocrine function, normalizing AMH levels. Despite different methods, both medications have been found to lower AMH levels. [15-18] A study by Puurunen et al. showed a significant decrease in AMH levels after six months of therapy, while a randomized controlled trial by Carlsen et al. showed no significant changes in AMH levels. However, the study showed a significant decrease in AMH levels after yoga, unlike a non-significant change after a 20-week weight loss program or an increase after drug suppression with dexamethasone.[23] Research shows yoga treatment leads to better improvements in AMH than metformin therapy, dexamethasone suppression, or physical activity, but more studies with longer follow-up periods are needed to understand long-term effects.

Hormone therapy and yoga therapy have been found to decrease average serum AMH levels in PCOS patients, but there was no significant difference in mean S. testosterone levels before and after treatment. Hormone therapy also helps combat hyperandrogenic symptoms. [15,16] Yoga, due to its holistic approach, can reduce hyperandrogenism in PCOS patients due to its postures, breathing exercises, and meditation. Both medications lowered testosterone levels, with yoga regulating hormones by reducing stress and improving health, while pharmacological treatment directly lowers androgen production. [20,21] Further studies with larger samples and longer follow-up periods are needed to understand the long-term effects and processes of these medications.[20]

The study found no significant difference in fasting blood glucose levels between hormone therapy and yoga therapy groups before and after treatment for polycystic ovarian syndrome (PCOS), with hormone therapy showing higher levels and yoga therapy showing lower levels. [16-18] Both hormone therapy and yoga therapy effectively reduced fasting blood glucose levels. Hormone medicines enhance the body's response to insulin, leading to improved insulin sensitivity. Engaging in activities like yoga may enhance metabolic health. Insulin resistance is a defining feature of PCOS and exacerbates hormonal and metabolic traits. It is logical to infer that insulin tolerance, linked to PCOS, contributes to less than 10% of glucose intolerance in premenopausal women. Dahlgren et al (1992) found that a notable number of premenopausal women with this illness may have reduced glucose tolerance. Further studies with larger sample sizes and longer follow-up periods are needed to understand the long-term effects and processes of these medications. [20,21,24]

Chang et al.'s 1983 study linked polycystic ovarian syndrome (PCOS) to insulin resistance, a condition caused by compensatory hyperinsulinemia.[25] Women with PCOS, especially those overweight or obese, are more likely to experience hyperinsulinemia. Hormone medication and yoga therapy have been shown to reduce fasting blood glucose levels in PCOS patients.

The study found no significant difference in fasting insulin levels between hormone therapy and yoga therapy groups before and after treatment. However, hormone therapy patients showed higher fasting insulin levels, while yoga therapy patients showed lower levels. Hormone treatments like metformin improve insulin sensitivity and decrease fasting insulin levels in PCOS patients. Yoga practice, including postures, breathing exercises, and meditation, reduces stress. [20,21,26,27] Both therapies effectively reduced fasting insulin levels, with pharmacologic hormone therapy enhancing the body's response to insulin and holistic lifestyle changes via yoga potentially enhancing metabolic health. The findings align with previous studies demonstrating that diet and exercise can manage metabolic abnormalities associated with PCOS, such as insulin resistance. [10,28,29]

The study found that hormone therapy and yoga therapy effectively reduced mean fasting insulin levels in PCOS patients. The choice of therapy may be influenced by patient preference, availability, and potential side effects. Hormone treatment directly affects endocrine metabolic pathways, while yoga

may enhance hormonal balance by reducing stress and making lifestyle changes. [15-18] Further research is needed to understand the long-term advantages and mechanisms of these medications.

The study found no significant difference in serum thyroid-stimulating hormone (S. TSH) levels between groups receiving hormone therapy and yoga therapy before and after treatment. The average serum TSH levels were 3.10±1.00 mIU/L in the hormone treatment group and 3.22±0.93 mIU/L in the yoga therapy group. The results suggest no substantial disparities in TSH levels across the groups. However, the average blood TSH levels of individuals on hormone treatment showed a significant drop. Yoga, on the other hand, showed a significant drop in TSH serum levels, suggesting that yoga can reduce TSH levels and improve thyroid health. [18,20,21]

Hormone medication and yoga therapy can decrease serum TSH levels in PCOS patients, with treatment decisions influenced by patient desire, accessibility, and potential adverse effects. No significant differences were found in S. cholesterol, S. triglyceride, HDL, or LDL levels before or after therapy. Both medications had similar impacts on lipid profile characteristics. Yoga practice may revert to normal levels after practice. Insulin resistance is linked to decreased HDL and increased triglyceride levels. [30,31]

The study found no significant differences in right ovary size or follicle quantity between hormone therapy and yoga therapy groups before and after treatment. However, there was a slight insignificant difference in follicle number before treatment, suggesting both regimens had similar effects on ovarian markers. There was a marginal difference in left ovarian volume before treatment, with hormone therapy potentially leading to a greater reduction.

The study has limitations, including a small sample size, short intervention duration, potential bias, and limited scope. Future studies should include larger sample sizes, longer follow-up periods, randomized controlled trials, and multicenter studies. Integrating lifestyle changes, dietary adjustments, stress management with yoga therapy could provide a holistic treatment strategy for PCOS, improving uptake and compliance.

Conclusion:

The study compared hormone replacement therapy and yoga therapy for improving the health of women aged 16-35 with PCOS. It assessed socio-demographic characteristics, biochemical indicators, and sonographic results before and after the therapies. Results showed no significant differences between the two groups. However, the hormone therapy group showed a significant decrease in left ovary volume, unlike the yoga therapy group. Both therapies showed comparable efficacy in improving PCOS-related health outcomes, suggesting yoga therapy could be a viable replacement for hormone therapy.

References

1. Ehrmann DA. Polycystic ovary syndrome. N Engl J Med. 2005;352:1223–1236
2. Chen X, Yang D, Mo Y, Li L, Chen Y, Huang Y. Prevalence of polycystic ovary syndrome in unselected women from Southern China. Eur J Obstet Gynecol Reprod Biol. 2008;139:59–64.
3. Barbosa, G. , de Sá, L. , Rocha, D. and Arbex, A. (2016) Polycystic Ovary Syndrome (PCOS) and Fertility. Open Journal of Endocrine and Metabolic Diseases, **6**, 58-65. doi: 10.4236/ojemd.2016.61008.
4. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Fertil Steril. 2004;81:19–25.
5. Kshetrimayum C, Sharma A, Mishra VV, Kumar S. Polycystic ovarian syndrome: Environmental/occupational, lifestyle factors; an overview. J Turk Ger Gynecol Assoc. 2019 Nov 28;20(4):255-263.
6. Stein I.F., Leventhal M.L. Amenorrhea associated with bilateral polycystic ovaries. Am J Obstet Gynecol. 1935;29:181–191.
7. Schally AV, Arimura A, Kastin AJ, Matsuo H, Baba Y, Redding TW, Nair RM, Debeljuk L, White WF. Gonadotropin-releasing hormone: one polypeptide regulates secretion of luteinizing and follicle-stimulating hormones. Science. 1971;173(4001):1036–1038.
8. Hashemipour M., Amini M., Iranpour R., Sadri G.H., Javaheri N., Haghighi S., et al Prevalence of congenital hypothyroidism in Isfahan, Iran: Results of a survey on 20,000 neonates. Horm. Res. 2004;62:79–83.
9. Selvaraj V, Vanitha J, Dhanaraj FM, Sekar P, Babu AR. Impact of yoga and exercises on polycystic ovarian syndrome risk among adolescent schoolgirls in South India. Health Sci Rep. 2020 Dec 4;3(4):e212.
10. Conte F, Banting L, Teede HJ, Stepto NK. Mental health and physical activity in women with polycystic ovary syndrome: A brief review. Sports Med. 2015;45:497–504.
11. Allahabadia GN, Merchant R. Polycystic ovary syndrome in the Indian subcontinent. Semin Reprod Med. 2008;26:22–34
12. Franik S, Eltrop SM, Kremer JA, Kiesel L, Farquhar C. Aromatase inhibitors (letrozole) for subfertile women with polycystic ovary syndrome. Cochrane Database Syst Rev. 2018 May 24;5(5):CD010287.

13. Weiss NS, Kostova E, Nahuis M, Mol BWJ, van der Veen F, van Wely M. Gonadotrophins for ovulation induction in women with polycystic ovary syndrome. Cochrane Database Syst Rev. 2019 Jan 16;1(1):CD010290.
14. Noyes N, Labella PA, Grifo J, Knopman JM. Oocyte cryopreservation: a feasible fertility preservation option for reproductive age cancer survivors. J Assist Reprod Genet. 2010 Aug;27(8):495-9.
15. Zawadzki JK, Dunaif A. Diagnostic criteria for polycystic ovary syndrome: towards a rational approach. Polycystic ovary syndrome. Dunaif A, Givens JR, Haseltine FP and M. GR. Boston, Blackwell Scientific: 377-384.
16. Alsamarai S, Adams JM, Murphy MK, Post MD, Hayden DL, Hall JE, Welt CK. Criteria for polycystic ovarian morphology in polycystic ovary syndrome as a function of age. The Journal of Clinical Endocrinology & Metabolism. 2009 Dec 1;94(12):4961-70.
17. Shanthi S. Utilization of Swamiji Vethathri Maharishis Kayakalpa Yoga Practice for women with PCOS. Aayagam Int J Multidiscipl Res. 2013;1:1.
18. Vigorito C, Giallauria F, et al. Beneficial effects of a three-month structured exercise training program on cardiopulmonary functional capacity in young women with polycystic ovary syndrome. J Clin Endocrinol Metab. 2007;92:1379-1384.
19. Rosenbaum P, Rubin DB. The central role of the propensity score in observational studies for causal effects. Biometrika 1983;70:41-55.
20. Kumarapeli V, Seneviratne RD, Wijeyaratne CN, Yapa RM, Dodampahala SH. A simple screening approach for assessing community prevalence and phenotype of polycystic ovary syndrome in a semiurban population in Sri Lanka. American journal of epidemiology. 2008 Aug 1;168(3):321-8.
21. Bluher M. Clinical relevance of adipokines. Diabetes Metab J. 2012;36(5):317-327.
22. Fruzzetti F, Benelli E, Fidecicchi T, Tonacchera M. Clinical and metabolic effects of alpha-lipoic acid associated with two different doses of myo-inositol in women with polycystic ovary syndrome. International Journal of Endocrinology. 2020 Mar 19;2020:1-8.
23. Puurunen J, Piltonen T, Morin-Papunen L, et al. Unfavorable hormonal, metabolic, and inflammatory alterations persist after menopause in women with PCOS. J Clin Endocrinol Metab. 2011;96(6):1827-1834
24. Dahlgren E, Janson PO, et al. "Polycystic ovary syndrome and risk for myocardial infarction." Acta Obstet Gynecol Scand 1992;71: 599-603.
25. Chang RJ, Nakamura RM, et al. (1983). "Insulin resistance in nonobese patients with polycystic ovarian disease." J Clin Endocrinol Metab 57: 356 -359.
26. Thakur D, Saurabh Singh DS, Tripathi DM, Lufang D. Effect of yoga on polycystic ovarian syndrome: A systematic review. J Bodyw Mov Ther. 2021 Jul;27:281-286.
27. Selvaraj V, Vanitha J, Dhanaraj FM, Sekar P, Babu AR. Impact of yoga and exercises on polycystic ovarian syndrome risk among adolescent schoolgirls in South India. Health science reports. 2020 Dec;3(4)
28. Pasquali R, Gambineri A, Cavazza C, Ibarra Gasparini D, Ciampaglia W, Cognigni GE, et al. Heterogeneity in the responsiveness to long-term lifestyle intervention and predictability in obese women with polycystic ovary syndrome. Eur J Endocrinol. 2011;164(1):53–60.
29. Moran C, Azziz R, Weintrob N, Witchel SF, Rohmer V, et al. Reproductive outcome of women with 21-hydroxylase-deficient nonclassic adrenal hyperplasia. The Journal of Clinical Endocrinology & Metabolism. 2006 Sep 1;91(9):3451-6.
30. Ferreira Santana L, Silva de Sa MF, Ferriani RA, De Moura MD, Foss MC, Dos Reis RM. Effect of metformin on the clinical and metabolic assessment of women with polycystic ovary syndrome. Gynecological endocrinology. 2004 Aug 1;19(2):88-96.
31. Chaya MS, Ramakrishnan G, et al. "Insulin sensitivity and cardiac autonomic function in young male practitioners of yoga." Natl Med J India 2008;21(5): 217-221.