Original Article

Yoga Intervention Improves the Metabolic Parameters and Quality of Life among Infertile Women with Polycystic Ovary Syndrome in Indian Population

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Abstract

Background: The heterogenic manifestations of polycystic ovarian syndrome have led to various treatment approaches that include improving hormonal imbalance, weight management, and improving quality of life (QoL). Yoga therapy being a versatile treatment approach benefits physical and mental well-being and can be recommended to women with polycystic ovary syndrome (PCOS). **Objective:** The objective of this study was to study the effect of structured yoga intervention on anthropometric, metabolic, hormonal, biochemical, ovarian morphology, and infertility-related QoL parameters among infertile women with PCOS. **Settings and Design:** A prospective, controlled before and after study was conducted at a Multidisciplinary PCOS Clinic in Mumbai, Maharashtra, India. **Methodology:** Infertile women with PCOS (26 participants in each group which includes intervention and control arm) seeking treatment for infertility at the Multidisciplinary PCOS Clinic at National Institute for Research in Reproductive and Child Health. The intervention group received 90 min of structured yoga intervention for 3 months. **Statistical Analysis:** The median change in parameters between baseline and after 12 weeks of intervention was analyzed using IBM SPSS software, version 26 to perform descriptive analyses and Wilcoxon test to analyze pre- and postintervention parameters in the intervention and control group. **Results:** There was a significant difference in the weight, basal metabolic rate, postglucose insulin, anti-Müllerian hormone, cholesterol, high-density lipoprotein, low-density lipoprotein, serum glutamic pyruvic transaminase, ultrasound parameters such as stromal thickness, follicle number per ovary, and QoL in infertility domain in the intervention group compared to the control group. Within 1 year of initiation of the study, 13 participants became pregnant in the yoga intervention group as compared to 7 participants in the control group. **Conclusion:** The metabolic comorbidities of PCOS have adverse effects on the QoL and pregnancy outcome among infertile women with PCOS. This pilot study demonstrated that a 12-week yoga intervention brought overall improvement in anthropometric, hormonal, biochemical, ovarian morphology, and infertility-related QoL parameters compared to the control group. Integration of yoga in infertility management will help to improve the QoL and to optimize prepregnancy metabolic parameters among infertile women with PCOS.

Keywords: *Infertility, polycystic ovary syndrome, quality of life, Yoga*

Introduction

Polycystic ovary syndrome (PCOS) is a multifaceted disorder, affecting 3.7%–22.5% of women of reproductive age.[1,2] It is associated with metabolic comorbidities, obesity, menstrual irregularity, infertility,[3,4] and mental health issues[2,5-8] causing sympathetic overdrive and stress.[9] This further compromises quality of life (QoL). Infertility has physical, psychological, emotional, social, and financial[10] effects resulting in marital maladjustment lowered self-esteem[11] and depression. Pharmacological interventions for psychological issues are judiciously advised in women undergoing fertility treatment.[12] Nonpharmacological management with interventions such as yoga benefits the body and the mind.[13] Yoga helps to optimize body weight and metabolic parameters and alleviates stress levels.[9,14,15] This study focused on the effect of yoga intervention on various parameters and QoL among infertile women with PCOS.

Methodology

This prospective, controlled before–after study was conducted among women with

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PCOS seeking treatment for infertility at a Multidisciplinary PCOS Clinic at a National Research Institute specializing in Reproductive and Child Health from 2018 to 2019. This study was conducted in collaboration with a renowned 98-year-old esteemed yoga institute specializing in research and training in yoga. The study was registered in the Clinical Trial Registry of India with Registration number: CTRI/2019/04/01842. The study was approved by the Institutional Ethics Committee (D/ICC/Sci-155/162/2018). Using an effect size of 0.5, for the postintervention median difference between the two groups, at a significance level of 5%, and a power of 0.80, the required sample size was calculated to be 64 per arm. Assuming 10% lost to follow-up, a total of 70 participants had to be recruited in each arm. The participants were nonrandomized due to logistic feasibility. Women availing infertility treatment and diagnosed with PCOS using Rotterdam criteria and willing to attend 12 weeks of yoga intervention were included in the study group, and those not willing to attend the yoga intervention were included in the control group. Women who were on medications such as oral contraceptive pills or metformin at the time of baseline investigations were excluded from the study. Women with hypothyroidism, hyperprolactinemia, raised 17-hydroxyprogesterone, raised follicle-stimulating hormone (FSH), and low anti-Müllerian hormone (AMH) were also excluded from the study. Details of the recruitment are given in Flowchart 1.

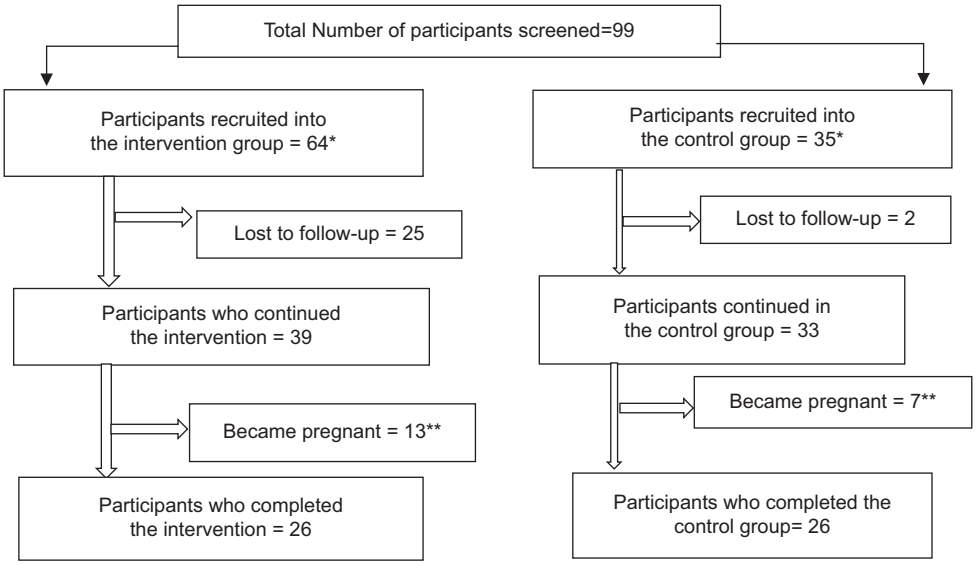
A detailed yoga module with stepwise pictorial representations of yogic postures for PCOS was developed in collaboration with the yoga institute. The practices consisted of asanas (yogic postures), pranayama, relaxation techniques, meditation, and lectures on yogic lifestyle and stress management. The details of the name and duration of each asana are given in Table 1.

Yogic practices were taught by a yoga expert for 90 min in a group session, thrice a week, for 12 weeks as per the yoga module. For the remaining 4 days of the week, these sessions were performed by the participants on their own at home, which was recorded in a compliance register by trained staff of the institute. The quality of the data was ensured by random checks of the parameters by the research team.

The participants in both groups received routine care which was provided by the institute. Routine care included a multidisciplinary treatment approach with gynecologists, nutritionists, dermatologists, and psychiatric counseling sessions (by trained staff).

A structured case record form was designed which included demographic details, chief complaints of the patients, anthropometric, hormonal, biochemical, hematological, metabolic, ultrasound parameters, and PCOS questionnaire (PCOSQ) tool. In addition, a telephonic interview was conducted to determine the acceptability, compliance, and constraints of practicing yoga.

The change in these parameters from the baseline (before 12 weeks) to postintervention (after 12 weeks) formed the primary outcome measure. Anthropometric measurements for height, weight, waist circumference; hip circumference, and waist–hip ratio were recorded as per standard procedures with calibrated instruments. Height was measured by standing upright against the wall with a stadiometer. The weight, body mass index (BMI), and basal metabolic



Flowchart 1: Details of the recruitment of the participants. *Although the required sample size was 70 in each arm, we could recruit 64 participants in the intervention group and 35 in the control group. As the study involved yoga intervention in person for 12 weeks it was difficult to retain the participants for the entire duration due to migration, commutation, household chores, and the COVID-19 pandemic. Due to the same reasons, there were more dropouts in the intervention group as compared to the control group. Those women who were not responding to three consequent phone calls from the institute or who refused to continue in the study were considered dropouts. **Women who became pregnant during the study (13 women in the intervention and 7 women in the control group) were excluded from the study for further analysis.

Table 1: Components of the structured yoga intervention with names and duration of each asana

Name of the practice	Duration
Prana Dharana	2 min
Shavasana	3 min
Ardha Halasana	30 s
Pawana Muktasana	With one leg - 30 s, with both legs - 30 s
Crocodile poses all	2 min
Naukasana in supine posture	30 s
Tadagi Mudra	1 min
Bhujangasana	30 s
Ardha Shalabhasana	30 s
Naukasana is a prone posture	30 s
Dhanurasana	30 s
Kati chakra lolasana	10 min as per capacity
Yoga Mudra	2 min
Vajrasana	2 min/as per capacity
Vakrasana	2 min
Supta Vajrasana	2 min/as per capacity
Janu Shirasana	30 s
Paschimottanasana	30 s
Marjarasana two poses	30 s
Bharadwajasana Twist/pose	30 s
Trikonasana	30 s
Bhadrasana	30 s
Chakkichalanasana	10 min as per capacity
Tadasana	30 s
Surya Namaskar	10 min
Kapalabhati	30 strokes increasing to 120 strokes thrice- 4 min
Bhramari Pranayama	3 rounds - 3 min
Anulom Viloma Pranayama	10 rounds - 2 min 30 s
Omkar Chanting	10 rounds - 4 min
Gayatri Mantra Chanting	10 rounds - 3 min
Eye closure technique followed by *Dhyana*	20 min

rate (BMR) were calculated using a body composition monitoring machine (OMRON-HBF-375). Blood pressure (BP) was measured using a sphygmomanometer. Participants were examined for signs of acne, and a pattern of hair loss was observed. Hirsutism was quantified using the modified Ferriman–Gallwey score and a score above 8 was considered clinically significant.

All the investigations were performed at a single NABL-accredited laboratory. Hormonal tests such as thyroxine, thyroid-stimulating hormone (TSH), prolactin, luteinizing hormone (LH), FSH, testosterone, sex hormone-binding globulin (SHBG), Free Androgen Index (FAI), and postglucose insulin were tested using chemiluminescence technique; AMH using paramagnetic particle chemiluminescence immunoassay; biochemical tests such as fasting blood sugar (FBS), fasting insulin, high-density lipoprotein (HDL), low-density lipoprotein (LDL), cholesterol, postglucose blood sugar (PGBS), serum glutamic pyruvic transaminase (SGPT), serum glutamic-oxaloacetic transaminase using spectrophotometry. The Homeostatic Model Assessment of insulin resistance (HOMA-IR) was calculated using the formula (Blood glucose [nmol/LxInsulinmU/mL]/22.5). Ultrasound parameters such as follicle number per ovary (FNPO), stromal volume, stromal thickness, ovarian volume, and endometrial thickness were assessed using 230 Volts, Version HD11E Philips Ultrasound Machine.

The QoL was assessed using the PCOSQ tool. Copyright permission for PCOSQ was obtained from the publishers (Order No. 501312418). The PCOSQ is a 26-item questionnaire consisting of five domains specifically targeted toward QoL in PCOS women which includes domains for emotion, body hair, weight, infertility, and menstruation. Each item was answered on a 7-point Likert scale, with possible scores ranging from 1 to 7. The mean scores for each domain reflect the respondent's feelings in the preceding 2 weeks with higher values indicating better QoL.

Data management

All statistical analyses were performed in IBM SPSS software, version 26 (IBM). Descriptive analyses such as frequency, percentage, mean and standard deviation were used for the analysis of demographic parameters and presenting features of participants. For anthropometric, hormonal, biochemical, ultrasound, and QoL parameters median, and inter-quartile differences (Q1–Q3) were determined. Nonparametric tests were performed for inferential analysis. Wilcoxon test was used to analyze pre (before 12 weeks) and post (after 12 weeks) parameter values within the intervention group and control group. For all analyses, $P < 0.05$ was considered statistically significant.

Results

Both the intervention and control groups consisted of 26 participants. The mean age of the participants in the intervention group was 27.2 ± 3.8 years and of the control group was 28.5 ± 3.8 years. The majority of the participants were graduates (n = 33, 63.4%) and housewives (n = 34, 65.3%). All the participants (n = 52) belonged to the upper socioeconomic class. Table 2 represents the baseline characteristics of the participants in the intervention and control groups.

The presenting features of the participants were similar in both the intervention and control groups as represented in Figure 1. Table 3 represents the anthropometric, hormonal, biochemical, ultrasound, and QoL parameters of the participants in the intervention and control groups at baseline (preintervention) and after 12 weeks (postintervention). The baseline value for the parameters was comparable among the intervention and control groups. Among anthropometric parameters,

Table 2: Baseline characteristics of the participants in the intervention and control group

Sociodemographic profile (*n*=52)	Intervention group (*n*=26), *n* (%)	Control group (*n*=26), *n* (%)
Age group (years)		
<25	10 (38.50)	7 (26.90)
>25	16 (61.50)	19 (73.10)
Education		
Secondary level	10 (38.50)	9 (34.60)
College level	13 (50.00)	15 (57.70)
Postgraduate level	3 (11.50)	2 (07.70)
Occupation		
Housewife	19 (73.10)	15 (57.70)
Skilled worker	1 (3.80)	4 (15.40)
Unskilled worker	2 (7.70)	3 (11.50)
Professional	3 (11.50)	4 (15.40)
Student	1 (3.80)	0
Socioeconomic class (BG Prasad classification) - Per capita income		
I (Rs. 7533 and above)	26 (100)	26 (100)
II (Rs. 3766–7532)	0	0
III (Rs. 2260–3765)	0	0
IV (Rs. 1130–2259)	0	0
V (Rs. 1129 and below)	0	0

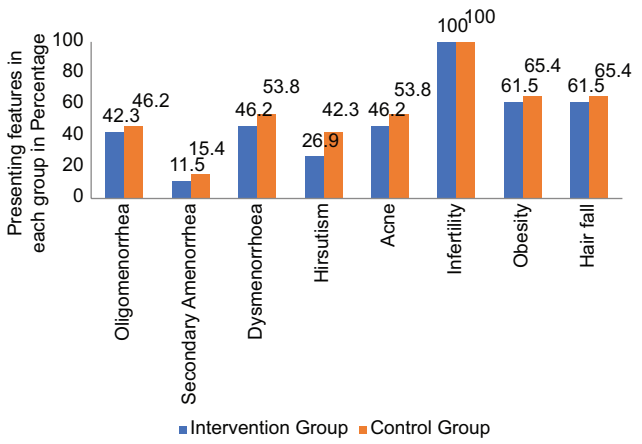


Figure 1: Presenting features of the participants in the intervention and control group in percentage

participants in the intervention group had a statistically significant reduction from baseline values in weight and BMR. Parameters, such as BMI, visceral fat percentage, and waist and hip circumference, demonstrated a reducing trend in the intervention group. Notably, an increase in waist circumference was observed in the control group. Significant reduction from the baseline value in postglucose insulin and AMH levels was observed only in the intervention group. Other parameters such as LH, serum testosterone, FAI, postglucose insulin, and cortisol were also reduced in the postintervention group. However, prolactin and TSH levels were slightly increased in the control group from baseline but were within the normal range. Other parameters such as cholesterol, HDL, LDL, and SGPT showed significant improvement from baseline values in the intervention group. Parameters such as FBS, PGBS, HOMA-IR, triglyceride, SGPT, and diastolic BP showed a positive association between the intervention group and the control group. A statistical difference from the baseline values in FNPO and stromal thickness was observed in the intervention group in comparison to the control. The ovarian volume has shown a reduction in the intervention group whereas else in the control group, there was an increase in the volume. Overall improvement was observed in the QoL parameters of the intervention group notably in the infertility domain.

A total of 20 participants (13 from intervention group and 7 from control group) became pregnant during the study period. On close examination of the data, we found that the participants who had long duration of infertility (2–10 years) conceived within 1 year after the initiation of yoga intervention.

Discussion

In this study, we assessed the effect of 12 weeks of yoga intervention on the anthropometric, hormonal, biochemical, ultrasound, and QoL parameters among infertile women who attended the multidisciplinary PCOS clinic at a national research institute.

Yoga helps in weight reduction through gentle and subtle mind management techniques. Our study could find this association in weight parameters similar to other studies.[16-18] Although in our study, there were clinical improvements in the waist circumference, hip circumference, and waist-to-hip ratio of the participants, it was not reflected statistically. This is important in PCOS as a reduction of 5% weight can restore regular menstruation and improve response to ovulation induction.[19] The statistical variation in weight parameters among various studies could be due

Table 3: Comparison of the median (inter-quartile difference) of anthropometric, hormonal, biochemical, ultrasound, and quality of life parameters within the intervention and control group

Parameters	Intervention group			Wilcoxon significant test value	Control group			Wilcoxon significant test value
	Baseline (median, inter-quartile difference)	After 12 weeks (median, inter-quartile difference)	*P**		Baseline (median, inter-quartile difference)	After 12 weeks (median, inter-quartile difference)	*P**	
Anthropometric parameters								
Weight (kg)	59.1 (15.9)	56.2 (17.3)	0.005	3.06	65.3 (18.1)	61.7 (21.2)	0.29	1.08
BMI (kg/m^2)	25.75 (4.1)	24.60 (4.8)	0.13	1.54	27.6 (6.4)	27.8 (6.4)	0.13	1.57
Skeletal muscle (%)	23.4 (2.6)	23.4 (1.6)	0.10	−1.68	23.05 (2.1)	23.5 (1.9)	0.86	−.86
Total fat (%)	35.05 (6.0)	35.45 (5.3)	0.84	00.20	35.8 (5.7)	35.8 (5.9)	0.27	−1.11
Visceral fat (%)	6.5 (3.6)	6.0 (4.3)	0.84	0.21	8.0 (6.6)	8.0 (5.8)	0.61	0.50
BMR	1240 (219)	1218.5 (244)	0.003	3.28	1283 (241.5)	1279 (304)	0.72	−0.35
Waist circumference	83 (12.6)	82.75 (18.7)	0.63	0.48	88.25 (23.5)	90 (18)	0.03	−.031
Hip circumference	97 (15)	95 (11.2)	0.50	0.67	98.75 (19.5)	100 (17.7)	0.59	−0.54
Hormonal parameters								
LH (mIU/mL)	10.5 (10.9)	9.3 (8.8)	0.64	0.47	9.43 (11)	8.58 (7.4)	0.25	1.16
FSH (mIU/mL)	6.31 (2.9)	6.62 (1.9)	0.52	−0.64	6.38 (3.0)	5.89 (1.4)	0.07	1.87
PRL (ng/mL)	11.5 (6.5)	13.7 (5.9)	0.18	−1.48	11.0 (6.8)	14.4 (10.4)	0.01	−2.08
T4 (µg/dL)	7.9 (1.9)	7.73 (2.2)	0.63	−0.49	7.95 (3.0)	8.07 (2.6)	0.21	1.12
TSH (µIU/mL)	2.32 (1.5)	2.72 (1.5)	0.12	−1.58	2.53 (1.2)	3.19 (1.4)	0.01	−3.55
Serum testosterone (ng/dL)	23.8 (20.3)	27.2 (19.3)	0.69	0.40	29.08 (23.7)	29.40 (23.9)	0.27	−1.11
SHBG (nmol/L)	39.45 (21.6)	39.9 (13.9)	0.72	−0.36	31.6 (21.2)	29.6 (21.3)	0.51	0.64
FAI	2.57 (2.1)	1.88 (2.0)	0.50	0.67	3.83 (5.1)	3.50 (5.4)	0.19	−1.32
Fasting insulin (mU/L)	11.59 (9.2)	10.95 (8.0)	0.87	0.16	15.64 (9.6)	16.21 (9.9)	0.51	0.66
Postglucose insulin (mU/L)	65.13 (70)	39.25 (42.9)	0.001	3.31	113.43 (90)	74.6 (124.6)	0.51	0.66
Cortisol (µg/dL)	9.13 (5.3)	8.10 (6.5)	0.64	0.47	11.16 (7.1)	9.52 (5.9)	0.13	1.53
AMH (ng/mL)	7.31 (5.0)	6.21 (5.3)	0.03	2.17	7.06 (6.1)	7.95 (7.3)	0.71	−0.39
Biochemical parameter								
Fasting blood sugar (mg/dL)	94 (6.5)	92 (12.2)	0.06	1.92	98.5 (15.7)	97 (15.5)	0.41	0.82
PGBS (75 g) (mg/dL)	104 (26.5)	99 (22.5)	0.09	1.96	122 (34.7)	107 (60.5)	0.22	1.25
HOMA IR	2.6 (2.2)	2.28 (2)	0.58	0.56	4.24 (3)	4.17 (2.3)	0.37	0.91
Cholesterol (mg/dL)	168 (59)	147.5 (42.7)	0.02	2.34	180.5 (48)	172 (47.7)	0.32	1.00
Triglycerides (mg/dL)	87 (68)	80 (46.7)	0.10	1.64	108 (37.2)	102 (48.2)	0.38	0.89
HDL (mg/dL)	38 (8.5)	41.5 (11.7)	0.05	−2.01	40 (11)	39 (10.5)	0.77	−0.30
LDL mg/dL	114 (55)	99.5 (33.2)	0.04	2.08	120 (31)	118 (37.5)	0.38	0.89
SGOT (U/L)	17 (9)	17 (6.2)	0.28	1.10	17 (7.2)	17 (6)	0.30	1.04
SGPT (U/L)	20 (10.7)	15.5 (10.5)	0.001	3.62	25 (11.5)	20 (14)	0.04	2.07
Systolic BP (mm/Hg)	108.5 (18.2)	109.5 (17.2)	0.60	−0.53	117 (17.2)	111 (16.2)	0.01	2.40
Diastolic BP (mm/Hg)	71.5 (13.2)	69.5 (15.7)	0.69	−0.39	73.5 (14.2)	72 (18)	0.08	1.81
Ultrasound parameters								
FNPO	18 (9.2)	12.5 (6.7)	0.04	2.16	13 (8.5)	14 (8)	0.43	−0.80
Stromal thickness	14 (7.5)	11.50 (5.2)	0.007	2.93	15 (7.5)	10 (5.2)	0.03	2.29
Ovarian volume	12.7 (8.3)	10.6 (6.7)	0.39	0.87	13.2 (7.8)	14 (5)	0.32	−1.01
QOL								
Total QOL	129 (43.5)	138 (39.2)	0.14	−1.52	120.5 (32.2)	116 (43.7)	0.64	0.47
Hair domain	33.5 (4.8)	33.5 (5)	0.62	−0.49	32.5 (12.5)	33.5 (8)	0.48	−0.70
Infertility domain	9 (5.2)	11.5 (5.5)	0.05	−2.01	10.50 (10)	8.50 (8.5)	0.71	0.36
Weight domain	28 (8.8)	30 (8.5)	0.04	−2.14	22 (15.3)	23 (13)	0.97	0.03
Menstrual domain	23.5 (11.5)	25.5 (9.5)	0.21	1.27	21.5 (9.8)	21.5 (15)	0.85	−0.19
Emotional domain	36.5 (16.5)	33.5 (14.2)	0.97	0.04	32.5 (14.7)	29 (11.7)	0.06	1.92

*Wilcoxon Sign test. BMI: Body mass index, LH: Luteinizing hormone, FSH: Follicle-stimulating hormone, TSH: Thyroid-stimulating hormone, SHBG: Sex hormone-binding globulin, AMH: Anti-Müllerian hormone, PGBS: Postglucose blood sugar, HOMA IR: Homeostatic model assessment of insulin resistance, HDL: High-density lipoprotein, LDL: Low-density lipoprotein, SGOT: Serum glutamic-oxaloacetic transaminase, SGPT: Serum glutamic pyruvic transaminase, BP: Blood pressure, QOL: Quality of life, FNPO: Follicle number per ovary, FBS: Fasting blood sugar, T4: Thyroxine, FAI: Free Androgen Index, BMR: Basal metabolic rate

to the small sample size, variation in frequency/duration of practice, inclusion of different yogic components, and home-practice component.[20] Our study results showed a reduction in BMR similar to other studies.[21,22] This is due to the effect of yoga in reducing sympathetic activity and/or stabilizing the nervous system[21] which improves the metabolic efficiency or BMR.

Yoga postures pressurize and depressurize specific glands and this subtle compression and decompression may regulate secretions to balance the hormonal levels.[23] A study among the reproductive age group showed that yoga nidra practice was helpful in patients with hormonal imbalances.[24] Although there was heterogeneity among various studies, a majority of the studies showed a positive outcome for yoga therapy on hormonal parameters such as LH, FSH, SHBG, TSH, and AMH.[25-27] Our study found a significant improvement in the AMH parameter among the intervention group. Studies have proven that exercise/physical activity is associated with improvements in ovarian hormones in women with abnormal ovarian function. This suggests that mechanisms associated with ovarian dysfunction can be improved by exercise in PCOS.[28,29] Data are scarce on the effect of yoga on AMH. Since yoga is an integral component of lifestyle modification, it can be considered that yoga may show a similar effect as exercise or physical activity. Elevation in testosterone is linked to the most severe type of depression and aggression.[30] Researchers found a 1-h mindful yoga class, done three times a week, reduced testosterone levels by 29% over 3 months.[31]

Yoga has a beneficial effect on weight, BP, insulin levels, triglycerides, fasting, postprandial blood sugar levels, pulse rate,[28,32,33] and lipid metabolism by stabilizing the hypothalamic–pituitary–adrenal axis and promoting autonomic balance in girls with PCOS.[20,21] Although yoga probably will not significantly alter functions of the endocrine system like growth, it may have a beneficial effect on the stress response. Kapalabhati is beneficial in PCOS as it improves hyperinsulinemia which is also present in PCOS.[34] Yogic postures are effective in reducing blood glucose levels. Our study found an improvement in postglucoseinsulin in the intervention group. Yoga may reduce stress, improve the metabolic profile, regulate the autonomic nervous system, and alter the hypothalamic–pituitary–adrenal axis which acts as a neural mediator of hyperglycemia.[35] Kapalabhati increases blood circulation and correction of glandular secretions.[34] Our study found similar results with metabolic parameters such as cholesterol, LDL, and indirect bilirubin among the intervention group. The asanas tone up the muscles, stimulate the pancreas, strengthen the abdominal muscles, and improve the digestive system.[25] Liver parameters were found to be benefited from yoga intervention.[25,36] Our study showed significant improvement in the SGPT parameters which is in concurrence with published studies.

A study revealed that yoga and naturopathy interventions are efficient in bringing about beneficial changes in polycystic ovarian morphology.[27] This can be confirmed by the assessment of the reduction of excess androgens, which are in turn associated with a characteristic poly follicular ovarian morphology.[37] Our study found similar results as the above two studies in terms of FNPO and stromal thickness of the ovary.

Chronic stress leads to decreased production of gonadotropin-releasing hormone, which prevents ovulation by starting a cascade of hormonally related changes. Yoga has a positive effect on psychological health by reducing stress, increasing pregnancy rates, and providing women with relaxation, training techniques, lifestyle changes, self-awareness, and social support components.[38] We used the PCOSQ to assess the improvement in QoL. The QoL in the infertility domain improved significantly in the intervention group in our study. This was in concurrence with the results of the study on Yoga-and Meditation-based Lifestyle Intervention, which found improvement in the QoL in couples with infertility of unknown origin.[39] Although there are fewer studies that assess the effect of yoga on infertility-related QoL, most of these studies have shown an improvement following yoga therapy similar to our study.[34,37,40] The practice of meditation and relaxation can help increase the clarity of the mind, maintain healthy body chemistry, and give patients the patience to undergo the rigors of infertility treatments.[40]

Galloping incidence of PCOS demands immediate attention along with other noncommunicable diseases (NCDs). The COVID-19 pandemic has put mental health issues in the spotlight. The integration of yoga into the management of PCOS can have positive outcomes. This can be considered the optimal time to integrate yoga with the existing national programs for NCD and reproductive health. Prescribing yoga or incorporating medical yoga therapy into the medical curriculum may aid in bringing the ancient system into practice.

Strength and limitations

To the best of our knowledge, this is the first study to assess the effects of yoga intervention on metabolic parameters and QoL among infertile women with PCOS. The strength of our study is that it was conducted with a well-structured yoga module comprehensively assessing various parameters. This ensured that the intervention was effective. All the parameters that are associated with PCOS and its comorbidities were all comprehensively investigated in this study for pre- and postevaluation. Both qualitative and quantitative aspects of infertility among women with PCOS were ubiquitously covered in this study. Some of the limitations of the study were as follows. As this study involved yoga intervention in person for 12 weeks, there were many challenges for the participants and the investigators. Some of the barriers were commutation,

household chores, and getting leave from the job. The investigator could not recruit more participants due to the COVID-19 pandemic. Overall, retaining the participants for 12 weeks was challenging.

Conclusion

The impact of PCOS along with infertility as a chronic disease on the QoL of women cannot be obscured. This study has shown that yoga intervention for 12 weeks improves the infertility domain of QoL. We found that yoga improves the outcome of fertility treatment. Taking lead from the positive findings of this study, a larger multicentric study with a larger sample size needs to be undertaken to generate robust evidence for the recommendation of yoga in the multidisciplinary management of PCOS and infertility. The issue of adherence of the participants can be improved using a digital platform and online sessions. Yoga intervention not only will help in prepregnancy optimization of metabolic parameters, reproductive outcomes, and QoL among infertile women with PCOS but also reduce the burden of NCDs in long run.

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Conflicts of interest

There are no conflicts of interest.

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