



A Narrative Review on the Role of Yoga on Polycystic Ovary Syndrome

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Abstract: PCOS is an endocrine condition affecting women of reproductive age. It is connected to a specific style of life. If treatment is put off, it lowers fertility and may result in serious new problems. The precise origin of polycystic ovarian syndrome is unknown because it is believed to be a complex metabolic disorder. It demonstrates infertility, obesity, hirsutism, acne, and menstrual disorders specifically. PCOS is treated based on how it presents clinically at different phases of life. Women with polycystic ovarian syndrome reported feeling more anxious than women in good health. The estimated range for PCOS prevalence worldwide is 6-26%. Depending on the menstrual, androgen, and infertility clinical characteristics, a therapeutic strategy is chosen. Current medical practises are unsatisfactory. For polycystic ovarian syndrome, alternative therapies are helpful, including herbal medicine, a nutritious diet, lifestyle changes, exercise, yoga, and techniques for reducing stress. A key component of PCOS treatment is lifestyle management. The best way to change one's lifestyle is to adopt yoga. Through the establishment of homeostasis, yoga helps the individual become healthy. The eight-limbed path of Ashtanga yoga promotes psycho-somatic equilibrium. At present, yoga, entails physical postures called asanas, breathing exercises called pranayam, and meditation called dhyana (Meditation). Yoga has the potential to be both preventative and curative, according to scientific data. It works well as a supportive treatment for PCOS patients to enhance their quality of life. Thus, the focus of this review is on defining the function of yoga in the treatment of PCOS. This review included all of the studies that looked at the impact of yoga on PCOS patients. Data search revealed substantially less literature on yoga and PCOS, although the six original studies indicated support for yoga's importance in PCOS management. It has an impact on overtly contributory factors such stress, insulin resistance, and obesity.

Keywords: PCOS, Yoga, Exercise, Obesity, Insulin Resistance, Mental Stress

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I. INTRODUCTION

In this contemporary era of change, people are straying from our tradition and culture. As a result, various psychological and psychosomatic problems, including anxiety and tension are increasing, especially in women. Their body's natural rhythm is disrupted causing variety of health issues, including metabolic disorders, reproductive disorders, menstrual cycle issues, ovarian enlargement, miscarriage, infertility and polycystic ovary syndrome. Polycystic ovary syndrome (PCOS) is an endocrine disorder of reproductive age. It is linked to a particular way of living. It affects fertility and can cause additional major issues if treatment is delayed. Since polycystic ovarian syndrome is thought to be a complex metabolic condition, its specific cause is uncertain. Polycystic ovarian syndrome is brought on by hormonal imbalance, which can be brought on by a number of variables including nutrition, heredity, environment, and way of life. It often shows menstrual dysfunction, hirsutism, acne, obesity, and infertility.¹ Hyperandrogenism (clinically or biochemically), irregular menstruation due to oligo-ovulation or ovulation, and polycystic changes in the ovary are the triad to define PCOS. It is considered a complex metabolic disorder. It can affect health beyond the reproductive years. It increases the risk of other physical and psychological abnormalities also. It reduces the quality of life and increases healthcare costs. It is often associated with insulin resistance, dyslipidemia, systemic inflammation, and endothelial dysfunction. Psychological factors such as stress contribute to raising cortisol and prolactin levels disturbing the normal menstrual cycle.² In comparison to healthy women, those who have polycystic ovarian syndrome reported having more anxiety.³ Another psychiatric disorder that can develop from anxiety is depression. Inactive women with polycystic ovary syndrome who don't practise yoga or other forms of exercise are more likely to experience mild depression, according to cross-sectional research.⁴ The estimated prevalence of PCOS is to be between 6-26%. Globally.⁵ In India, its prevalence is 8.10% in females in the reproductive age group.⁶ Although its prevalence and effect on other systems are increasing, the cause of PCOS is still unknown. Different factors are involved in its pathogenesis, so various treatment tactics are applied for this disease. Current pharmacologic therapies focus on reducing the increased level of androgen, regulating the menstrual cycle with the help of oral contraceptives, and improving ovulation. Although this treatment is suggested, the safety and security of these drugs are uncertain for long-term use. It has various adverse effects and increases the risk of developing breast and cervical cancer and thrombosis. In addition, the Food and Drug Administration of America has not approved any drugs for their use in polycystic ovary syndrome.⁷ A sedentary lifestyle and stress are contributing factors to its increasing prevalence. Obesity and insulin resistance have a vital role in the pathogenesis of PCOS. PCOS is treated according to clinical presentation at various life stages. The treatment choice depends on the clinical features of menstruation, androgen, and infertility.⁸

1.1 Etiology and diagnosis

1.1 Ayurveda perspective

Diet (Ahara), lifestyle (Vihara) (daytime sleep and overnight work, lack of exercise and meditation), and mental factors (Manasic) all play significant roles in PCOS. These conditions

cause the Vata-kapha dosha to get vitiated and transform into Vata-kapha Artava dushti. There are two categories of vikrut ahara pravrutti in Ayurveda: Atisantarapanaj, which produces obesity, and Atiatarapanaj, which causes infertility and Shukra Mansa kshaya. The type of Aahar, having properties of Madhura, Sheeta, Snigdha, Guru, make Prithvi and Jala Mahabhootas dominant and increase the body's Meda and Kapha content. Adhyashana, Virudhaashana, and the popularity of fast food contribute to the vitiation of Jatharagni and the formation of Ama, which triggers the pathophysiology of obesity. Fat accumulation was harmed by inactivity, daytime sleep deprivation, and midnight employment, which ultimately resulted in Vata kapha Artava dusti (PCOS).

1.2 Modern science perspective

Insulin resistance in the periphery is related to PCOS. obesity, a typical sign of PCOS. Particularly, hyperinsulinaemia increases the frequency of GnRH pulses, while high levels of LH contribute to high levels of androgen (male hormone, testosterone) production, low levels of FSH contribute to poor ovum development and the inability to ovulate, and decreased SHBG (Sex hormone binding globulin) binding all contribute to the onset of PCOS. Both patients with normal weight and those with overweight PCOS frequently have insulin resistance. Typically, the clinical, ultrasound, and biochemical parameters are used to make the diagnosis of PCOS. The diagnosis can be confirmed by asking questions regarding menstrual cycle, weight, and hirsutism. Transvaginal Sonography may show multiple cysts in ovary, and there may be an increase in ovarian size (>10 cm³), stromal echogenicity, and the accumulation of small follicular cysts in a "string of pearls" pattern (about 12 follicles between two and nine millimetres in size). Because there are so many follicles, the ovaries are typically 1.5 to 3 times larger than they should be. Biochemical Characteristics Increased serum levels of androgens, such as testosterone and Dehydroepiandrosterone Sulfate (DHEAS): The free androgen index is frequently used as a replacement because free testosterone is more sensitive than total. No medication can cure PCOS completely. It is said that maintaining a proper lifestyle with a balanced diet, exercise, and yoga can help in reducing the features and severity of PCOS. There is strong discontent with current medicinal treatment. Alternative treatments including herbal medicine, a healthy diet, lifestyle modification, exercise, yoga, and stress-relieving methods are beneficial for polycystic ovarian syndrome. The key to treating PCOS is to relax. We can achieve a disease-free body and a healthy mind by incorporating yoga and meditation early in life. Pranayama (breathing exercises) are potent methods that help to keep the mind calm.

1.3 Effect of Asanas in PCOS

Asanas (yoga postures) designed for PCOS help open up the pelvic area and encourage relaxation. A number of asanas, including paschimottan asan bhujangasan, suryanamaskar, and shalabhasan, aid in burning fat and detoxifying the body. Stress-relieving yoga poses like Makarasan and, Shavasana among others, and pranayama.⁹ Along with this, there are several calming meditations that have a profound impact on the body as a whole, aiding in the system's detoxification and discomfort. Yoga stands out among these as the finest complementary and alternative therapy because it promotes metabolism-boosting weight loss, stress-relieving relaxation of

the body and mind, and stress relief. In traditional yogic texts like Hatha Yoga Pradipika, and Gherand Samhita, a few particular and significant asanas are listed. These asanas clearly have an effect on the reproductive organs. In ancient days, women used to do physical exercise in the form of household work. It may have been linked with improvement in endocrine function. Hence lifestyle modification is an essential factor in the treatment of PCOS. The adoption of Yoga is the best method of lifestyle modification. Yoga establishes homeostasis and eventually makes the individual healthy. Patanjali first described yoga in yoga sutras. Ashtanga yoga is an eight-limbed path for psycho-somatic harmony. Each component of Ashtanga yoga has its importance. The first four limbs (Yama, Niyam, Asana and pranayam) are linked with external cleansing, whereas the following four (Pratyahara, Dharna, Dhyana and Samadhi) are considered internal cleansing. The prime aim of Ashtanga Yoga is the purification of the body and mind. All limbs are interconnected with each other and influence each other. Every part of the body is positively affected by the practice of yoga. Presently we practice Yoga, which consists of Asanas (physical postures), Pranayam (Breathing techniques), and Dhyana (Meditation). Yoga is a mind-body fitness technique. Stress is a contributing factor to many psychosomatic disorders. We can observe that the participation rate is increasing day by day in the mind-body fitness program. Scientific studies on yoga are also increased in recent years to evaluate its efficacy in various disorders.

1.4 Effect of Exercise in PCOS

For PCOS-afflicted women, weight loss strategies may be helpful. Exercise helps restore the hypothalamic-pituitary-gonadal axis' regulation of ovulation in obese and overweight women, whether or not they have PCOS. Exercise also helps lower insulin and free androgen levels. Exercise likely modifies the hypothalamic-pituitary-gonadal axis through its effect on ovulation. By reducing visceral fat and increasing lean muscle mass, physical resistance training (PRT) alone can enhance hyperandrogenism, reproductive ability, and body composition. It lowers fasting blood sugar and plasma testosterone levels in PCOS-afflicted women while raising androstenedione levels and decreasing sex hormone binding globulin levels.¹⁰ The morphology of the ovaries and the glycemic index in PCOS-afflicted women are improved by resistance exercise. It enhances ovarian volume, body composition measurements like weight, BMI, and body fat, and has positive effects on the insulin resistance index.¹¹ Insulin resistance, more circulating leukocytes, and greater tissue inflammation are symptoms of polycystic ovarian syndrome. Aerobic exercise lowers circulating leukocytes and enhances

insulin sensitivity in obese people. Circulating leukocyte levels are increased in women with polycystic ovary syndrome. Aerobic exercise helps treat this illness and is linked to an increase in insulin sensitivity. In PCOS women who exercise regularly, WBC levels are greater and total adiponectin levels are lower. Regular aerobic activity for four weeks lowers serum leptin levels; after eight weeks, it increases the ratio of leptin to high molecular weight adiponectin significantly; and after sixteen weeks, it significantly raises serum dehydroepiandrosterone sulphate levels.¹²

1.5 Dietary modification in PCOS

Currently, there is no prescribed diet for PCOS. However, there is general consensus that the following foods appear to be helpful for these women: A) A food that has a low glycemic index, like legumes, fruits, whole grains, nuts, seeds, , starchy vegetables, and unprocessed foods. B) A diet low in inflammatory foods like berries, salmon, kale, and extra virgin olive oil. C) The DASH (dietary methods to control hypertension) diet, which contains low-fat dairy products, poultry, fruits, and vegetables as well as whole grains. The DASH diet lowers blood pressure and heart disease risk. Other foods that can be incorporated into a diet include natural, unprocessed foods, foods high in fibre, fatty fish like salmon and tuna, spinach, dark red fruit like cherries and blueberries, broccoli and cauliflower, dried beans, lentils, and walnuts as well as nuts and seeds like almonds and pistachios. Sugary beverages like sodas and energy drinks, refined carbs like pastries, cakes, and white processed bread, processed meat, and other foods should all be avoided. Other healthy eating practises include eating small, frequent meals, eating at regular intervals, consuming the majority of your daily carbs around lunch or equally spaced out throughout the day, and drinking lots of water. As the prevalence of PCOS is increasing, it is necessary to make aware of the role of yoga in PCOS for health care professionals. So this review is focused on delineating the role of Yoga in the management of PCOS.

1.6 Data source

Related articles were searched with PubMed, and Google scholar and incorporated only original papers. Case reports, case series, and review articles were excluded from the study.

1.7 Observation

Search of the various database found the following studies on Yoga in PCOS were

Table No. 1- Original studies on Yoga in PCOS

Sr. no.	Year of Publication	Author	Title	Outcome
1	2012	Ram Nidhi et al. 13	“Effect of Yoga program on quality of life in adolescent polycystic ovarian Syndrome”: A Randomized Control Trial	It can be said that a 12-week yoga programme is much more helpful than exercise for improving the quality of life and reducing PCOS symptoms in adolescent girls.
2	2012	Ram Nidhi et al. 14	“Effect of a holistic yoga program on anxiety symptoms in adolescent girls with polycystic ovarian syndrome”: A randomized control trial	A holistic yoga program for 12 weeks has significantly reduced symptoms of anxiety in adolescent girls with PCOS

3	2018	<u>M.Ezhil Ratnakumari et al.</u> ¹⁵	“Study to Evaluate the Changes in Polycystic Ovarian Morphology after Naturopathic and Yogic Interventions”.	Yoga and Naturopathy interventions are found to be effective in changing the morphology of polycystic ovarian syndrome
4	2020	Valarmathi Selvaraj et al. ¹⁶	“Impact of Yoga And Exercises On Polycystic Ovarian Syndrome Risk Among Adolescent Schoolgirls In South India”.	In adolescent girls, yoga and exercise can minimize PCOS risk as assessed by the assessment scale.
5	2020	Vishesha Patel et al. ¹⁷	“Regular Mindful Yoga Practice as a Method to Improve Androgen Levels in Women with Polycystic Ovary Syndrome”: A Randomized, Controlled Trial	Mindful yoga intervention is revealed its effect in lowering free testosterone and dehydroepiandrosterone levels
6	2021	Mariam Mohseni et al. ¹⁸	“Yoga Effects on Anthropometric Indices and Polycystic Ovary Syndrome Symptoms in Women Undergoing Infertility Treatment”: A Randomized Controlled Clinical Trial	This study showed that yoga (asana) exercises for six weeks improved Hirsutism and abdomen and hip circumference in infertile women.

2. DISCUSSION

Polycystic ovary syndrome (PCOS) is a high-prevalence endocrine disorder of reproductive age, influencing 5–15% of ladies as right on time as the second decade of life. As the reasons for the infection stay obscure, it is analysed dependent on agreement models and avoiding other endocrine issues. One of the main guidance lines for overseeing PCOS indications is weight reduction, where proper, combined with a solid, even eating healthy regimen. Furthermore, women with PCOS are offered the overall guidance to be dynamic. The inquiry of the different data sets discovered six investigations on Yoga in PCOS. In the investigation, Ram Nidhi et al. made two gatherings. Yoga bunch included Surya namaskar (sun greeting), Asanas (stances), Pranayama breathing activities, unwinding, and contemplation. Interestingly, the regular exercise bunch had strolling, standing, sitting, and recumbent activities with no yogic ideas or breathing activities. They discovered lower TT, LH, FI, HOMA-IR, and AMH in the yoga bunch than in the activity bunch. Slam Nidhi et al. likewise evaluated the impact of a yoga program on nervousness manifestations. They tracked down a massive decrease in uneasiness side effects to the examination gathering of activity. They had remembered contemplation for a yoga program. Studies showed a high predominance of nervousness in PCOS women.¹⁹ Kerchner et al.²⁰ additionally recorded an 11.6% commonness of tension conditions in PCOS. Examination of cyclic contemplation on sound, male volunteers, decreased nervousness as evaluated by Spielberg's inventory.²¹ Also, a two-month (90 min two times every week) yoga meditation showed a significant reduction in tension in ladies experiencing uneasiness disorders²² In the study by M Ezhil Ratnakumari, Fifty PCOS patients were enlisted, and yoga treatment was given for 12 weeks. Yoga treatment includes specific asanas in which the lower part of the body has particular movement. Pranayama was also included, specifically Bhramari, Suryabhedan, Nadishodhan and Kapalbhathi. In naturopathy, hydrotherapy, manipulative treatment, mud treatment, fasting, and regular eating regimen treatment were given. They noticed a massive improvement in ovarian morphology, anthropometric estimations, and monthly cycle recurrence in the intercession bunch. Valarmathi Selvaraj et al. studied the effect of yoga and exercises on school girls to discover their

impact on the polycystic ovarian condition. They included Bhadrasana (Butterfly present), Chakki Chalanasana (moving the granulating wheel), Pranayama, and Meditations. It was found to impact the risk reduction of PCOS positively. In the study of Vishesha Patel et al., thirty PCOS patients aged 23 to 42 years were enrolled. It was found that mindfulness yoga practice thrice a week had improved serum androgen levels, but they did not find a significant change in insulin and glucose found in the study of Nidhi et al. It might be due to thrice-a-week yoga practice. In the study of Nidhi et al., there was the rigorous practice of yoga. Participants have also experienced an improvement in anxiety. Mariam Mohseni et al. conducted a study to evaluate six weeks of yoga exercises to assess its effect on anthropometric parameters and other signs of PCOS. It is observed that the abdominal circumference, hip circumference, and hirsutism were significantly improved compared to the standard group. Obesity has a pathogenetic role in PCOS. Abdominal phenotypes are specifically responsible for insulin resistance and related hyperinsulinemia²³ Dunaif et al. emphasized that insulin is an essential reproductive hormone. Androgens also play a significant role in the sensitivity of insulin and its secretion²⁴. PCOS and metabolic syndrome have a common pathophysiology. Both are related to oxidative stress, and pranayama plays an essential role in oxidative stress. Pranayama is one of the essential elements of Ashtanga yoga. ‘prana’ is a force of life, and ‘Ayama’ is expansion. It is a practice of breathing consciously. Kapalabhati is a quick breathing procedure that is a type of abdominal-respiratory exercise. It invigorates the respiratory and stomach receptors. Kapalabhati is found to adjust muscle-to-fat ratio dispersion and consequently decrease both midsection boundary and hip circumference²⁵. During Kapalbhathi, stretching abdominal muscles helps the pancreatic cells regenerate, enhancing glucose uptake and its utilization in tissues. So it helps reduce blood sugar levels²⁶. It is also proven that Kapalbhathi directly stimulates the pancreas and increases insulin secretion. Kapalbhathi reduces oxidative stress, which helps in decreasing body fat. Obesity is a major contributing factor in the etiopathogenesis of PCOS. Kapalbhathi positively influences the brainstem and cortex; eventually, it regulates the endocrine-metabolic process. PCOS is firmly connected to mental indications²⁷. Yoga treatment arranges the neuroendocrine axis, diminishing pressure and adjusting the neurohormonal profile. It

additionally decreases serum testosterone levels demonstrating ideal changes in hormonal profiles²⁸. Yoga treatment expands alpha waves and diminishes serum cortisol levels responsible for stress reduction²⁹. In the meta-analysis of forty-one studies on PCOS by Jiby Jolly Benjamin et al., they found significantly higher cortisol levels in PCOS patients than in healthy women³⁰. Psychological stress is directly proportional to the glycaemic index. It means stress causes insulin resistance. In patients with PCOS, hyperglycaemia is found in the later stage. Hence if psychological stress is reduced by yoga (mindful-based stress reduction practice)³¹, it might act on PCOS. It is proposed that mental and physiological relaxation techniques could be advantageous in PCOS³². The study conducted by Takahashi T et al. Meditation is found to be effective in increasing the parasympathetic index and decrease in the sympathetic index³³. The neuroendocrine stress response is aggravated by emotional stress. Mindful-based stress reduction helps manage emotional stress and thus can benefit the disorders related to psychological stress³⁴.

3. CONCLUSION

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From the above review, it is concluded that Yoga has a unique role in managing PCOS. It is known that obesity, insulin resistance, and anxiety are the contributing factors to PCOS. Yoga programs, including Asanas, Kapalbhathi, and meditation, reduce Obesity, Insulin Resistance, and Anxiety. These conditions are often found in PCOS. In the search of a database, there is significantly less research in this area. Hence it is necessary to study various techniques of Yoga. Yoga therapy, specially Yogasan and Pranayama, should be studied explicitly in the triad of PCOS, i.e. menstrual irregularity, polycystic ovaries and Hyperandrogenism

4. AUTHORS CONTRIBUTION STATEMENT

The study's conceptualization and appropriate studies' gathering were done by Janhvi Mirase. All the data were examined and organised appropriately by Dr. Vaishali Kuchewar. The final manuscript was helped by Shweta Parwe.

5. CONFLICT OF INTEREST

Conflict of interest declared none.

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