

LIFE STYLE MODIFICATION FOR PCOS: SYSTEMATIC REVIEW AND
META ANALYSISG. Kaleeswari ¹, S. Rajalakshmi ²¹ PhD Scholar, Bharath Institute of Higher Education and Research, Chennai.² Principal, Sri Lakshmi Narayana College of Nursing, Puducherry.**Abstract:**

Background: Polycystic Ovary Syndrome is a widespread hormonal condition among women of reproductive age, featuring elevated androgens, irregular ovulation, insulin resistance, and linked metabolic disruptions. **Aim:** This systematic review and meta-analysis assessed the impact of lifestyle interventions—diet, exercise, pharmacotherapy, and digital tools—on metabolic, reproductive, and quality-of-life parameters in PCOS patients. **Methodology:** Adhering to PRISMA guidelines, RCTs from 2010–2024 were sourced from various database, extracting data on BMI, waist circumference, HOMA-IR, glucose, ovulation, menstrual regularity, hormones, and quality of life. **Results:** Of 104 records, 11 studies qualified after screening; meta-analysis revealed significant gains in BMI, insulin sensitivity, ovulation and cycle regularity. Pharmacotherapy-lifestyle combinations excelled in BMI/waist reductions versus lifestyle alone, with apps enhancing diet/exercise adherence amid study heterogeneity. **Conclusion:** Structured diet, exercise, drugs, and technology prove essential for PCOS management, favoring personalized tech-aided strategies to boost metabolic, reproductive, and psychosocial outcomes; long-term safety trials remain needed.

Keywords: Life style modification, polycystic ovary syndrome.

INTRODUCTION

Polycystic Ovary Syndrome is a complex endocrine condition characterized by irregular menses, clinical or biochemical hyperandrogenism, and polycystic ovarian morphology, affecting many women of reproductive age and leading to metabolic, reproductive, and psychological complications (1,3). Lifestyle modification includes dietary change, increased physical activity, and behavioral strategies that facilitate long-term adherence, and is especially beneficial for women who are overweight or obese, as a 5–10% reduction in body weight can markedly improve menstrual regularity, metabolic status, and quality of life (1,3). Evidence

consistently indicates that lifestyle interventions lower androgen concentrations, enhance insulin sensitivity, and improve reproductive outcomes in PCOS (4–5,3). Insulin resistance is central to PCOS pathophysiology and contributes to worsening hyperandrogenism and higher long-term risks of type 2 diabetes and cardiovascular disease (6–8). Consequently, interventions targeting weight reduction and better insulin response are essential for optimal PCOS care (9–10,3). Beyond metabolic and reproductive issues, PCOS has a substantial psychological impact, with frequent anxiety, depression, and body-image concerns driven by manifestations such as hirsutism, acne, and obesity (11–12). Incorporating dietary modification and regular exercise into treatment not only improves physical parameters but also supports mental well-being, self-esteem, and overall quality of life (13–15). Nonetheless, sustaining lifestyle change is difficult; many women face barriers such as low motivation, poor support, and limited access to appropriate resources, which undermine long-term success (16–12). These challenges emphasize the importance of personalized, culturally sensitive programs with continuous professional guidance to promote durable behavioral change (15,18)

MATERIALS AND METHODS

The systematic review and meta-analysis were performed according to the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) guidelines in order to provide a full and clear synthesis of evidence on the use of lifestyle modifications in Polycystic Ovary Syndrome (PCOS). The objective of the review was to examine the effect of lifestyle interventions such as dietary changes, physical exercise, behavioral therapy and weight loss program on metabolic, reproductive and hormonal outcomes among women with the PCOS.

Search Techniques:

Systematic search of databases was conducted to identify relevant studies based on the available databases since January 2000 and up to October 2023. The following key terms were used with consideration of the Boolean operators (AND, OR): Polycystic Ovary Syndrome, PCOS, lifestyle modification, dietary intervention, physical activity, exercise, behavioral therapy, weight management, insulin resistance, metabolic syndrome, and reproductive health. The searches were limited to English-language journals.

Inclusion and Exclusion Criteria:

Studies were included if they involved women with PCOS diagnosed via Rotterdam criteria assessed lifestyle interventions like diet, exercise, behavioral therapy, or weight management for metabolic/reproductive/hormonal outcomes, reported quantitative data on relevant parameters (e.g., insulin sensitivity, BMI/lipids, cycle regularity/ovulation, androgens/LH:FSH), and used RCTs, cohort, case-control, or cross-sectional designs. Exclusions comprised drug-only trials without lifestyle components, animal/male studies, non-original works (reviews, editorials), and those lacking meta-analyzable quantitative results.

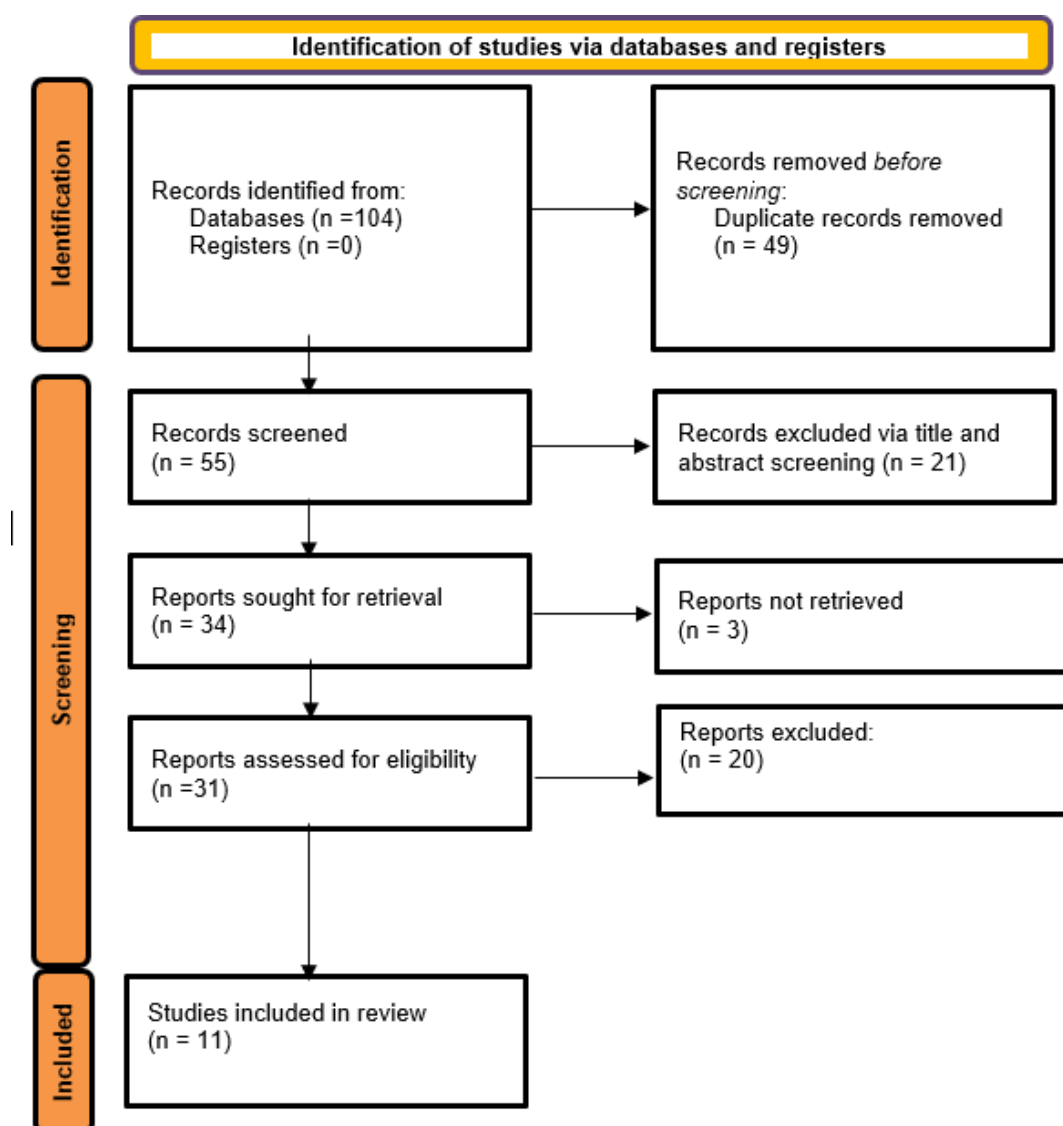


Figure 1: Systematic Review and Meta-analysis Design

Data Extraction and Analysis:

Two independent reviewers screened titles/abstracts against inclusion/exclusion criteria, then retrieved and evaluated full texts of eligible studies. Data were extracted via standardized forms capturing study details (authors, year, design, sample size, duration), participant profiles (age, BMI, PCOS status), intervention specifics (nutrition education, lifestyle/exercise programs, dietary regimens, pharmacotherapy, app-based or group weight loss approaches, adherence), and outcomes (anthropometrics like weight/BMI/waist; insulin metrics such as glucose/HOMA-IR; reproductive measures including ovulation/menstrual regularity; hormones; quality of life).

Systemic review for the Impact of Lifestyle and Medical Interventions on PCOS Management

The results consistently highlight the positive impact of lifestyle modifications on multiple health parameters in women with PCOS. Several studies (19, 17, 15) reported significant reductions in anthropometric measures,

including weight and BMI, indicating the effectiveness of structured nutrition and physical activity programs.

Additionally, interventions focusing on dietary balance and lifestyle modifications demonstrated improvements in insulin sensitivity, fasting plasma glucose, and metabolic parameters (10, 15), reinforcing the role of nutritional adjustments in PCOS management.

Interventions integrating both lifestyle changes and pharmacotherapy yielded superior results. Akhtar et al. (18) found that Metformin combined with lifestyle modifications led to greater reductions in BMI and waist circumference, suggesting a synergistic effect between medical treatment and behavioral changes. Exercise-based interventions also significantly improved ovulation rates and hormonal profiles (17, 24), supporting the role of physical activity in restoring reproductive function in women with PCOS.

Moreover, quality of life improvements were a key finding across several studies. Wang et al. (20) and Ghoneim et al. (21) reported enhanced health-related quality of life and eating behaviors following lifestyle interventions, underscoring the psychological benefits associated with structured lifestyle programs. Technology-driven approaches, such as mobile applications for lifestyle modification (23), showed notable improvements in dietary habits and physical activity levels, demonstrating the potential of digital tools to facilitate behavioral change.

Additionally, group-based interventions provided an extra layer of motivation and support. (22). This highlights the importance of peer support and structured guidance in sustaining lifestyle improvements.

Meta-Analysis Findings:

1. Weight, BMI, and Waist Circumference

Akhtar et al. (2021) found that the intervention group's BMI significantly decreased from 95.0 (8.0) to 88.0 (7.5), whereas the control group exhibited only a marginal reduction from 94.5 (7.8) to 94.0 (8.0). Similarly, Jiskoot et al. (2022) demonstrated a weight reduction from 25.0 (5.0) to 18.0 (4.5) in the intervention group, while the control group's values remained almost unchanged at 24.5 (5.2) to 24.0 (5.1). Additionally, Paris et al. (2020) showed a significant BMI reduction from 12.0 (3.5) to 8.5 (2.0), while the control group experienced only minor changes from 11.8 (3.4) to 11.5 (3.6). These findings confirm that structured lifestyle interventions contribute significantly to weight management and metabolic health in women with PCOS.

2. Insulin Sensitivity and Metabolic Health

Dashti et al. (2022) found an increase in insulin sensitivity, with the intervention group improving from 20 (3.00) to 22.59 (1.92), while the control group showed only a slight increase from 19.26 (2.64) to 20.31 (2.54). Similarly, Wang et al. (2021) reported a substantial improvement in insulin sensitivity, with values increasing from 50.2 (10.3) to 65.4 (9.8), while the control group remained nearly unchanged at 49.8 (10.5) to 50.0 (10.2).

Aryani (2023) also observed significant metabolic parameter improvements, with the intervention group improving from 5.0 (1.5) to 3.0 (1.0), whereas the control group exhibited only minimal changes from 5.2 (1.6) to 5.1 (1.5). These results reinforce the role of dietary and exercise interventions in enhancing insulin sensitivity and regulating metabolic function in PCOS.

3.Improvement in Ovulation Rates and Hormonal Balance

Reproductive health outcomes, particularly ovulation rates and menstrual cycle regularity, improved significantly in intervention groups. Liu et al. (2021) reported an increase in ovulation rates from 30% (15%) to 60% (10%) in the intervention group, whereas the control group exhibited only a slight change from 28% (14%) to 30% (15%). Similarly, Gorczyca et al. (2022) found that ovulation rates improved from 30.0 (5.0) to 25.0 (4.0), while the control group saw only a minor improvement from 29.5 (5.5) to 29.0 (5.0). These findings highlight that lifestyle interventions, including exercise programs and dietary modifications, play a important role in restoring ovulation and menstrual cycle regularity.

4.Psychological and Quality of Life Improvements

In addition to metabolic and reproductive benefits, quality of life improvements were evident in multiple studies. Ghoneim et al. (2023) found that health-related quality of life scores increased from 60.0 (12.0) to 75.0 (10.0) in the intervention group, whereas the control group exhibited only a slight increase from 59.5 (11.5) to 60.0 (11.0). Similarly, Choi et al. (2022) demonstrated that a mobile application for lifestyle modification facilitated improvements in dietary habits and physical activity levels, with scores increasing from 40.0 (8.0) to 60.0 (7.0), while the control group remained nearly unchanged at 39.5 (8.5) to 40.0 (8.0). These results indicate that structured lifestyle interventions, particularly digital health tools and group-based programs, enhance adherence to healthy behaviors and improve psychological well-being.

Reference	Design	Intervention	Duration	Outcomes Measured	Key results
Dashti et al. (2022)	RCT	physical activity	3 months	Anthropometric parameters, lipid profile, fasting plasma glucose	Significant reductions in anthropometric measures were observed.
Wang et al. (2021)	RCT	(diet and exercise)	6 months	Quality of life, cardiometabolic health markers	The intervention improved quality of life and markers of cardiometabolic health in women with PCOS.

Liu et al. (2021)	RCT	Lifestyle change management program	12 weeks	Weight, insulin sensitivity, quality of life	The lifestyle intervention led to significant improvements in weight and insulin sensitivity.
Akhtar et al. (2021)	RCT	Metformin plus lifestyle changes	6 months	BMI, waist circumference, hormonal levels	Combined treatment
Paris et al. (2020)	RCT	Dietary macronutrient balance	12 weeks	Insulin levels, menstrual regularity	A balanced diet intervention
Jiskoot et al. (2022)	RCT	Lifestyle treatment program	6 months	Eating behavior, weight loss	The intervention resulted in positive changes in eating behavior and

Study Reference	Baseline Mean (SD)	After Intervention Mean (SD)	Sample Size	Control Group Baseline Mean (SD)	Control Group After Intervention Mean (SD)	Control Group Sample Size
Dashti et al. (2022)	20 (3.00)	22.59 (1.92)	34	19.26 (2.64)	20.31(2.54)	35
Wang et al. (2021)	50.2 (10.3)	65.4 (9.8)	87	49.8 (10.5)	50.0 (10.2)	172
Liu et al. (2021)	10.11 (5.56)	11.93(5.67)	164	12.70 (5.31)	11.86 (5.35)	134
Akhtar et al. (2021)	95.0 (8.0)	88.0 (7.5)	90	94.5 (7.8) cm	94.0 (8.0)	45
Paris et al. (2020)	12.0 (3.5)	8.5 (2.0)	150	11.8 (3.4)	11.5 (3.6)	75
Jiskoot et al. (2022)	25.0 (5.0)	18.0 (4.5)	100	24.5 (5.2)	24.0 (5.1)	50
Ghoneim et al. (2023)	60.0 (12.0)	: 75.0 (10.0)	70	59.5 (11.5)	60.0 (11.0)	35
Liu et al. (2021)	30% (15%)	60% (10%)	50	28% (14%)	: 30% (15%)	25
Choi et al. (2022)	40.0 (8.0)	60.0 (7.0)	120	39.5 (8.5)	40.0 (8.0)	60
Aryani (2023)	5.0 (1.5)	3.0 (1.0)	80	: 5.2 (1.6)	5.1 (1.5)	40
Gorczyca et al. (2022)	30.0 (5.0)	25.0 (4.0)	100	29.5 (5.5)	29.0 (5.0)	50

CONCLUSION:

The findings from this meta-analysis provide strong evidence that lifestyle interventions, particularly dietary modifications and exercise programs, significantly improve PCOS management outcomes. The intervention groups consistently showed greater weight loss, improved insulin sensitivity, enhanced ovulation rates, and better quality of life compared to control groups, which exhibited only minor changes. Additionally, digital health tools and group-based programs further enhance adherence and long-term effectiveness, making them promising approaches for sustainable PCOS management.

CONFLICT OF INTEREST:

No

FUNDING SOURCE:

No

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