



COMPARING MYOINOSITOL AND METFORMIN IN WOMEN WITH PCOS: A STUDY FROM A NORTH INDIAN TERTIARY CARE HOSPITAL

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ABSTRACT **Background:** Polycystic ovary syndrome (PCOS) is a common hormonal condition affecting many women of reproductive age. Metformin is often prescribed to help manage insulin resistance in PCOS, but it comes with side effects that can affect compliance. Myoinositol, a vitamin-like compound, is emerging as a gentler alternative. **Objective:** This study aimed to compare how effective and safe myoinositol is when compared to metformin in Indian women diagnosed with PCOS. **Methods:** We conducted a randomized, open-label study at Rajshree Medical Research Institute from January 2024 to May 2025. A total of 200 women diagnosed with PCOS using Rotterdam criteria were divided into two groups. One group received myoinositol (2g twice a day) with folic acid; the other took metformin (500 mg three times a day). The main outcome we looked at was whether their menstrual cycles became regular. We also tracked weight, hormone levels, insulin resistance, and any side effects. **Results:** After 12 weeks, 72% of the women taking myoinositol and 68% of those on metformin had regular menstrual cycles ($p = 0.56$). Both groups showed improvements in weight, blood sugar, and hormone levels. However, women on myoinositol had fewer side effects (6% vs. 38%, $p < 0.001$). Importantly, free testosterone levels dropped more and SHBG levels rose more in the myoinositol group. **Conclusion:** Myoinositol worked just as well as metformin in treating PCOS—but with far fewer side effects. It's a promising, well-tolerated option that deserves a place in routine PCOS care.

KEYWORDS : PCOS, Myoinositol, Metformin, Menstrual irregularity, SHBG, Insulin resistance

INTRODUCTION

Polycystic ovary syndrome (PCOS) affects around 5–20% of women of reproductive age globally, and is one of the most common causes of irregular periods, excess facial hair, acne, and difficulty conceiving (1,2). Diagnosing PCOS typically involves looking for at least two out of three features: irregular ovulation, high male hormones, or polycystic ovaries on ultrasound—known as the Rotterdam criteria (3).

At the heart of PCOS lies a problem with insulin. Many women with PCOS have insulin resistance, which leads to elevated insulin levels. This, in turn, worsens hormonal imbalance by increasing testosterone and disrupting ovulation (4,5).

Metformin is a drug that's been used for years to help manage insulin resistance in PCOS. While it's effective, many women experience stomach discomfort, nausea, or diarrhea that makes them stop taking it (6,7).

An alternative that's been gaining attention is myoinositol. It's a natural compound—part of the vitamin B complex—and it helps insulin work better in the body. Some studies have found it can improve ovulation and reduce testosterone, with fewer side effects than metformin (8–10).

Our study set out to see whether myoinositol could match metformin in effectiveness and be better tolerated in Indian women with PCOS.

MATERIALS AND METHODS

Study Design: Prospective, open-label, randomized controlled trial

Study Setting: Rajshree Medical Research Institute, Bareilly

Study Duration: January 2024–May 2025

Sample Size: 200 patients (calculated for 80% power and 5% significance level)

Inclusion Criteria:

- Age 18–35 years
- Diagnosed with PCOS using Rotterdam criteria (3)
- No hormonal treatment in the last 3 months

Exclusion Criteria:

- Diabetes mellitus
- Liver or kidney disease

- Current pregnancy or lactation

Randomization & Treatment:

Patients Were Randomized Into Two Groups:

- Group A: Myoinositol 2 g twice daily + folic acid 200 mcg
- Group B: Metformin 500 mg thrice daily

Duration of Therapy: 12 weeks

Primary Outcome:

- Menstrual cycle normalization (eumenorrhea)

Secondary Outcomes:

- Changes in BMI, fasting glucose, insulin, HOMA-IR
- Total and free testosterone, SHBG
- Adverse events

All biochemical analyses were conducted in the institutional laboratory using standardized methods. Statistical analysis was done using SPSS v25. A p -value < 0.05 was considered significant.

RESULTS

Baseline Characteristics:

Parameter	Myoinositol Group	Metformin Group	p-value
Age (years)	25.4 ± 3.8	25.7 ± 4.0	0.53
BMI (kg/m ²)	27.3 ± 3.2	27.1 ± 3.1	0.48
Oligomenorrhea (%)	100%	100%	—

Menstrual Regularity:

- 72% inositol group vs 68% metformin ($p = 0.56$)

Secondary Outcomes:

Parameter	MI (Δ mean ± SD)	Metformin (Δ mean ± SD)	p-value
BMI (kg/m ²)	-0.7 ± 0.2	-0.6 ± 0.3	0.60
Fasting Glucose (mg/dl)	-4.1 ± 1.3	-5.5 ± 1.2	0.42
Fasting Insulin (μU/ml)	-5.2 ± 1.4	-5.5 ± 1.5	0.71
HOMA-IR	-1.5 ± 0.6	-1.7 ± 0.5	0.48
Free Testosterone (ng/dl)	-0.43 ± 0.11	-0.31 ± 0.15	0.04
SHBG (nmol/L)	+24.1 ± 5.4	+11.5 ± 3.2	0.03

Adverse Effects:

- Myoinositol: 6% (mild bloating)
- Metformin: 38% (nausea, diarrhea); 9% discontinued

DISCUSSION

Our study supports the emerging role of myoinositol as a safe and effective alternative to metformin in PCOS. Both treatments showed significant improvement in insulin resistance and menstrual cyclicity, consistent with prior reports (10,13).

Importantly, myoinositol significantly increased SHBG and reduced free testosterone levels compared to metformin, corroborating meta-analyses by Greff et al. and Zhang et al. (10,14). SHBG elevation reflects improved hepatic insulin sensitivity, thereby reducing free androgens (5,15).

The tolerability profile of myoinositol was markedly better. While metformin caused adverse effects in over one-third of patients, MI had minimal side effects, reinforcing findings by Rajasekaran et al. and Shokrpour et al. (11,12).

These outcomes suggest that myoinositol, owing to its dual action on insulin signaling and ovarian function (8), can be a first-line agent in women intolerant to metformin or preferring natural therapies.

CONCLUSION

Myoinositol demonstrates comparable efficacy to metformin in improving metabolic and endocrine parameters in PCOS with significantly better safety and tolerability. It can be considered a first-line or alternative option in managing PCOS, especially in patients intolerant to metformin.

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