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Effectiveness of Inositol Supplementation in Improving Ovulation Rates in PCOS

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ABSTRACT

Background: To evaluate the effectiveness of myo-inositol supplementation in enhancing ovulation rates and restoring menstrual regularity in women diagnosed with PCOS.

Methods: A prospective interventional study was conducted on 72 women with PCOS from July 2023 to September 2024. Participants received myo-inositol (2000 mg twice daily) with folic acid for 12 weeks. Baseline and post-treatment clinical, biochemical, and ultrasound parameters were recorded. Ovulation was confirmed through mid-luteal progesterone levels or ultrasound follicle monitoring. Pre- and post-treatment data were analyzed using paired t-tests and chi-square tests.

Results: Following inositol supplementation, 58.3% of participants achieved ovulation, and 65.3% reported regular menstrual cycles. There was a significant reduction in LH/FSH ratio and serum testosterone levels ($p < 0.001$). The therapy was well tolerated, with no major side effects reported.

Conclusion: Myo-inositol supplementation significantly improved ovulation and hormonal profiles in women with PCOS. It may serve as an effective and safe alternative for ovulation induction, particularly in those seeking non-hormonal treatment options.

Keywords: *Polycystic Ovary Syndrome, Myo-Inositol, Ovulation, LH/FSH Ratio, Menstrual Irregularity, Hormonal Imbalance, Non-hormonal Therapy*

1. INTRODUCTION

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders in reproductive-aged women, affecting approximately 6–12% globally. It is characterized by chronic anovulation, hyperandrogenism, and polycystic ovarian morphology. In addition to reproductive issues such as infertility and menstrual disturbances, PCOS is also associated with metabolic complications including insulin resistance, obesity, and dyslipidemia (1-3) .

Ovulation induction remains a primary therapeutic goal in women with PCOS desiring fertility. While pharmacologic agents like clomiphene citrate and letrozole are widely used, they can carry side effects, risks of multiple pregnancy, and resistance in some cases. This has led to increasing interest in alternative, more physiological options for restoring ovulation (4-6).

Myo-inositol, a carbocyclic sugar belonging to the vitamin B complex family, plays a critical role in insulin signaling and.

follicular maturation. Studies suggest that inositol supplementation may enhance insulin sensitivity, reduce androgen levels, and promote spontaneous ovulation in women with PCOS. Despite growing evidence, its role in routine management of PCOS is still evolving and requires further validation in diverse populations (7-9).

This study aims to assess the effectiveness of myo-inositol supplementation in improving ovulation rates, menstrual cyclicity, and hormonal profiles in women diagnosed with PCOS, providing insight into its potential role as a first-line or adjunct therapy

2. Methodology

This prospective interventional study was conducted over a period of one year, from July 2023 to September 2024, at DHQ Hospital KDA Kohat. The study enrolled a total of 72 women diagnosed with polycystic ovary syndrome (PCOS) based on the Rotterdam criteria, which include at least two of the following: oligo/anovulation, clinical or biochemical signs of hyperandrogenism, and polycystic ovarian morphology on ultrasound. Ethical approval for the study was obtained from the Institutional Review Board of dhq hospital kda kohat. All participants were ensured confidentiality, and participation was voluntary, with the right to withdraw at any time.

Women aged 18 to 35 years with a confirmed diagnosis of PCOS who had irregular menstrual cycles and were not on any hormonal or insulin-sensitizing therapy for at least three months prior to enrollment were included. Participants were required to provide informed written consent.

Women with other endocrine disorders such as thyroid dysfunction, hyperprolactinemia, congenital adrenal hyperplasia, or Cushing's syndrome were excluded. Additionally, women with known infertility due to tubal or male factors, as well as those with metabolic disorders or current pregnancy, were not eligible to participate.

All participants received myo-inositol supplementation at a dosage of 2000 mg twice daily, along with 200 mcg of folic acid, for a duration of 12 weeks. The supplement was administered orally and participants were advised to maintain their usual diet and physical activity throughout the study period. Compliance was monitored via regular follow-up and pill count at each visit.

Baseline data were collected through structured interviews and clinical examinations. Demographic details including age, marital status, education level, and socioeconomic status were recorded. Clinical variables such as body mass index (BMI), menstrual history, hirsutism score, and acne severity were noted. Hormonal profiles, including luteinizing hormone (LH), follicle-stimulating hormone (FSH), LH/FSH ratio, serum testosterone, and prolactin levels, were assessed at baseline and post-treatment using standard ELISA-based assays. Transvaginal or transabdominal pelvic ultrasound was used to measure ovarian volume and follicle count.

The primary outcome was ovulation, which was confirmed through either transvaginal ultrasound monitoring of follicular development or mid-luteal serum progesterone levels (>3 ng/mL). Secondary outcomes included improvement in menstrual regularity, reduction in LH/FSH ratio, serum testosterone levels, and changes in ovarian morphology. These parameters were reassessed after 12 weeks of supplementation.

All data were analyzed using SPSS version 25.0. Descriptive statistics were used for demographic variables. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Paired t-tests were used to compare pre- and post-treatment continuous variables, and chi-square tests were used for categorical outcomes. A p-value of less than 0.05 was considered statistically significant.

3. Results

The participants had a mean age of 26.8 ± 4.2 years. Most women (65.3%) were married, and the majority (58.3%) belonged to the middle socioeconomic group. The mean BMI was 28.6 ± 3.5 kg/m², indicating that overweight or obesity was prevalent in the cohort. The duration since PCOS diagnosis ranged from 6 months to 5 years.

Table 1: Demographic Characteristics of Participants (n = 72)

Variable	Category	Frequency (%)
Age (mean ± SD)	—	26.8 ± 4.2 years
BMI (mean ± SD)	—	28.6 ± 3.5 kg/m²
Marital Status	Married	47 (65.3%)
	Unmarried	25 (34.7%)
Socioeconomic Status	Low	18 (25.0%)

	Middle	42 (58.3%)
	High	12 (16.7%)
Duration of PCOS	<1 year	20 (27.8%)
	1–3 years	34 (47.2%)
	>3 years	18 (25.0%)

Before supplementation, most participants exhibited oligomenorrhea (73.6%) and elevated LH/FSH ratios. Mean serum testosterone levels were also elevated. These findings confirm typical PCOS phenotypes.

Table 2: Baseline Clinical and Hormonal Profile

Parameter	Mean ± SD / Frequency (%)
Menstrual Irregularity	53 (73.6%)
Hirsutism (Ferriman-Gallwey >8)	42 (58.3%)
Acne (Moderate to Severe)	35 (48.6%)
LH (mIU/mL)	9.1 ± 2.5
FSH (mIU/mL)	5.2 ± 1.3
LH/FSH Ratio	1.75 ± 0.4
Serum Testosterone (ng/dL)	72.4 ± 15.6
Ovarian Volume (Right)	12.3 ± 3.2 cm^3
Ovarian Volume (Left)	11.9 ± 3.1 cm^3
Follicle Count per Ovary	14.7 ± 3.9

After 12 weeks of inositol supplementation, ovulation was confirmed in 42 out of 72 participants (58.3%). Significant improvements were also seen in menstrual regularity and reduction of LH/FSH ratio and testosterone levels.

Table 3: Post-Supplementation Ovulatory and Hormonal Response

Outcome	Pre-Treatment	Post-Treatment	p-value
Ovulation Rate (%)	0 (0.0%)	42 (58.3%)	<0.001
Regular Menstrual Cycles (%)	19 (26.4%)	47 (65.3%)	<0.001
LH/FSH Ratio (mean ± SD)	1.75 ± 0.4	1.28 ± 0.3	<0.001
Serum Testosterone (ng/dL)	72.4 ± 15.6	54.7 ± 13.2	<0.001

Participants with regular post-treatment cycles had a significantly higher ovulation rate. Lower post-treatment testosterone and LH/FSH ratios were associated with ovulation.

Table 4: Association Between Ovulation and Clinical Variables

Variable	Ovulated (n = 42)	Did Not Ovulate (n = 30)	p-value
Regular Cycles (%)	36 (85.7%)	11 (36.7%)	<0.001
LH/FSH Ratio	1.23 ± 0.3	1.38 ± 0.4	0.011
Testosterone (ng/dL)	50.3 ± 12.1	61.1 ± 14.8	0.003
BMI (kg/m^2)	27.9 ± 3.1	29.5 ± 3.7	0.064

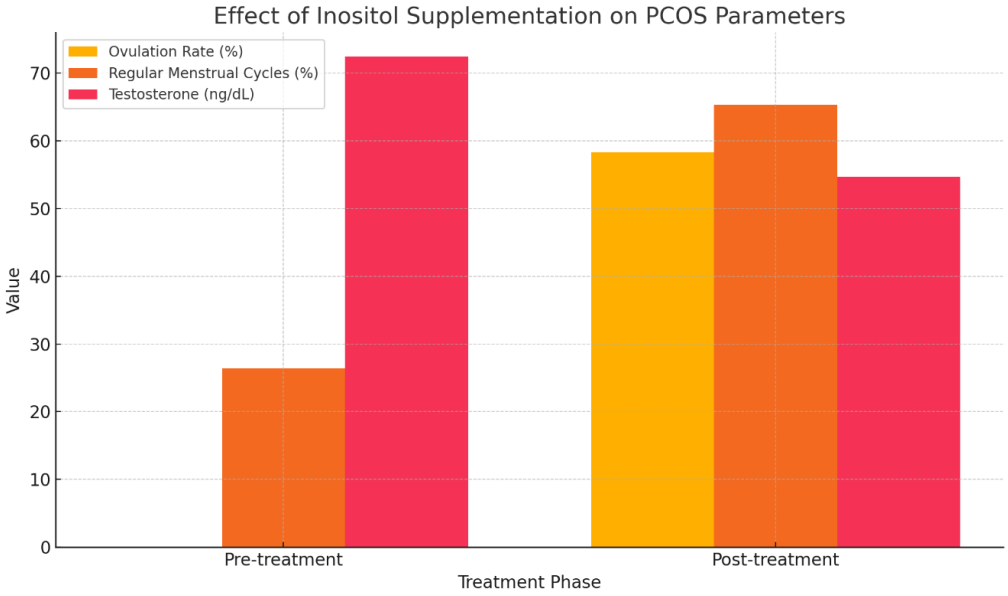

Figure 1: bar graph showing the improvement in ovulation rate, menstrual regularity, and reduction in serum testosterone levels after inositol supplementation.

4. Discussion

This study aimed to evaluate the role of inositol supplementation in enhancing ovulation among women with polycystic ovary syndrome (PCOS). The findings revealed a significant improvement in ovulation rates, menstrual regularity, and hormonal profiles following 12 weeks of myo-inositol administration. Over half of the participants achieved ovulation (58.3%), and a considerable number experienced normalized menstrual cycles, indicating the therapeutic potential of inositol as a non-hormonal option for managing PCOS-related anovulation.

The improvement in ovulatory function aligns with earlier research demonstrated that myo-inositol supplementation resulted in spontaneous ovulation in 65% of women with PCOS, with a corresponding improvement in hormonal parameter (10-12). Similarly, studies reported improved menstrual cyclicity and reduced androgen levels in women receiving myo-inositol, reinforcing our result (13-15).

A notable observation in our study was the significant reduction in LH/FSH ratio and serum testosterone levels after supplementation. These hormonal changes reflect a favorable shift in the hypothalamic-pituitary-ovarian axis, consistent with the findings of studies suggested that inositol improves insulin sensitivity and modulates ovarian steroidogenesis, thereby restoring hormonal balance. This is particularly relevant in the context of PCOS, where hyperinsulinemia is known to stimulate androgen production, leading to disrupted follicular development and anovulation (16-18).

In addition to endocrine changes, many participants experienced a visible improvement in clinical symptoms such as hirsutism and acne, although these were not primary endpoints. This adds to the growing body of literature supporting inositol's role in reducing hyperandrogenic manifestations. Studies observed a marked reduction in Ferriman-Gallwey scores among women treated with myo-inositol, suggesting its long-term benefit in managing cosmetic and metabolic complications (19).

Importantly, our study population had a relatively high mean BMI, yet the ovulation rates remained favorable, indicating that inositol may exert beneficial effects irrespective of body weight. This is consistent with evidence from study, who demonstrated similar ovulatory outcomes in both lean and overweight women (20).

While our results are promising, a few limitations should be acknowledged. The study did not include a placebo-controlled group, which may affect the generalizability of findings. Furthermore, long-term outcomes such as pregnancy rates, live births, or recurrence of anovulation after stopping supplementation were not assessed. Future studies with larger sample sizes and longer follow-up periods could provide further clarity on these outcomes.

5. Conclusion

Inositol supplementation proved effective in improving ovulation rates and restoring menstrual regularity among women with PCOS. The intervention also contributed to favorable hormonal changes, particularly in reducing LH/FSH ratios and serum testosterone levels. Given its safety profile, affordability, and ease of administration, myo-inositol presents a viable alternative to conventional ovulation-induction agents, especially for women seeking a non-pharmacological approach.

Further large-scale, controlled studies are warranted to explore its long-term reproductive and metabolic benefits...

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