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RESEARCH ARTICLE
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EFFECT OF BODY MASS INDEX ON MENSTRUAL CYCLE REGULATION IN WOMEN WITH POLYCYSTIC OVARY SYNDROME RECEIVING INSULIN-SENSITIZING THERAPY

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Abstract

Objective: To assess the influence of body mass index (BMI) on menstrual cycle regulation in women with polycystic ovary syndrome (PCOS) treated with insulin-sensitizing therapy.
Study Design Randomized controlled trial**.**
Place and Duration of Study: Department of Obstetrics and Gynecology, Unit III, Civil Hospital Karachi, over a period of six months**.**
Methodology: This study enrolled 208 women aged 15–40 years diagnosed with PCOS according to Rotterdam criteria. Participants were randomly assigned to receive either metformin alone (500 mg three times daily) or metformin combined with inositol (500 mg three times daily plus inositol 1 g twice daily). Patients were stratified into BMI categories: ≤25 kg/m², 25.1–29.9 kg/m², and ≥30 kg/m². Treatment efficacy was evaluated by achievement of three consecutive regular menstrual cycles within six months. Statistical analysis was performed using SPSS version 20.
Results: Across all BMI categories, women receiving combination therapy demonstrated significantly higher rates of menstrual cycle regularization compared to those receiving metformin alone. In participants with BMI ≤25 kg/m², menstrual regularity was achieved in 100% of patients on combination therapy versus 29.4% on metformin alone ($p<0.001$). Similar statistically significant outcomes were observed in overweight and obese BMI groups.
Conclusion: Body mass index did not negatively affect menstrual cycle response in women receiving combined insulin-sensitizing therapy. The addition of inositol to metformin resulted in superior menstrual regulation across all BMI categories.

Keywords: Polycystic ovary syndrome; Body mass index; Metformin; Inositol; Menstrual cycle regulation

Introduction

Polycystic ovary syndrome (PCOS) is a prevalent endocrine disorder in women of reproductive age and is commonly associated with menstrual irregularities, hyperandrogenism, and infertility. Among the various factors contributing to disease severity, body mass index (BMI) plays a critical role in modifying metabolic and reproductive outcomes.

Obesity is frequently observed in women with PCOS and is strongly associated with insulin resistance, hyperinsulinemia, and worsening of menstrual dysfunction. Elevated BMI has been linked to reduced ovulatory response and poorer treatment outcomes, making weight-related factors an important consideration in therapeutic decision-making.

Insulin-sensitizing agents such as metformin have been widely used to address metabolic abnormalities and improve menstrual cyclicity in PCOS. However, response to metformin monotherapy is inconsistent, particularly in overweight and obese women. Inositol, a naturally occurring insulin mediator, enhances intracellular insulin signaling and may potentiate the effects of metformin.

Given the high prevalence of obesity among women with PCOS in South Asian populations, evaluating the effect of BMI on treatment response is essential. This study aimed to determine whether body mass index influences menstrual cycle regulation in women with PCOS receiving insulin-sensitizing therapy.

Methodology

Study Design and Setting

A randomized controlled trial was conducted in the outpatient department of Obstetrics and Gynecology, Unit III, Civil Hospital Karachi.

Study Duration

Six months.

Study Population

Women aged 15–40 years diagnosed with PCOS based on Rotterdam diagnostic criteria.

Inclusion Criteria

- Women aged 15–40 years
- Diagnosis of PCOS based on at least two of the following:
- Oligo- or anovulation
- Clinical or biochemical hyperandrogenism
- Polycystic ovaries on ultrasonography

Exclusion Criteria

- Pregnancy or lactation
- Diabetes mellitus, hypertension, renal or hepatic disease
- Thyroid disorders or Cushing syndrome
- Ongoing pharmacological treatment for PCOS

Sample Size and Randomization

A total of 208 participants were enrolled and randomly allocated into two equal groups using the sealed envelope method.

Intervention

Group A: Metformin 500 mg three times daily
Group B: Metformin 500 mg three times daily plus inositol 1 g twice daily

BMI Stratification
Participants were categorized into three BMI groups:
- ≤25 kg/m²
- 25.1–29.9 kg/m²
- ≥30 kg/m²

Outcome Measure
Efficacy was defined as achievement of three consecutive regular menstrual cycles (21–35 days) within six months of treatment initiation.

Statistical Analysis
Data were analyzed using SPSS version 20. Quantitative variables were expressed as mean ± standard deviation, and qualitative variables as frequencies and percentages. The chi-square test was applied, with $p<0.05$ considered statistically significant.

Results
All 208 participants completed the study. Baseline demographic and clinical characteristics were comparable between treatment groups.
In women with BMI ≤25 kg/m², menstrual cycle regularity was achieved in all patients receiving combination therapy, compared to 29.4% of those treated with metformin alone ($p<0.001$).
Among overweight participants (BMI 25.1–29.9 kg/m²), 100% of women receiving metformin with inositol achieved menstrual regulation, whereas only 28.6% responded to metformin monotherapy ($p<0.001$).
Similarly, in obese women (BMI ≥30 kg/m²), menstrual regularity was observed in all patients receiving combination therapy, compared to 23.7% in the metformin-only group ($p<0.001$).
These findings demonstrate consistent superiority of combination therapy irrespective of BMI category.

Discussion
This study demonstrates that body mass index does not limit the effectiveness of combined insulin-sensitizing therapy in women with PCOS. Despite the well-recognized adverse impact of obesity on reproductive outcomes, the addition of inositol to metformin resulted in uniform menstrual cycle regulation across all BMI categories.
The enhanced response observed with combination therapy may be attributed to improved insulin signaling at both systemic and cellular levels. Inositol acts as a second messenger in insulin pathways, potentially overcoming BMI-related insulin resistance that limits the response to metformin alone.
The consistent benefit across lean, overweight, and obese women highlights the clinical utility of combination therapy, particularly in populations with high rates of obesity and metabolic dysfunction.

Conclusion
Menstrual cycle regulation in women with PCOS receiving insulin-sensitizing therapy is not adversely affected by body mass index. Metformin combined with inositol demonstrates superior efficacy compared to metformin alone across all BMI categories and represents an effective treatment option for menstrual dysfunction in PCOS.

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