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EFFECTS OF PERSONALIZED AND COMBINED TREATMENT STRATEGIES ON INSULIN SENSITIVITY AND REPRODUCTIVE OUTCOMES IN WOMEN WITH POLYCYSTIC OVARY SYNDROME

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Abstract

Background: Polycystic ovary syndrome (PCOS) is a multifaceted endocrine disorder characterized by metabolic dysregulation and impaired reproductive function. Insulin resistance is a central pathogenic mechanism contributing to hyperandrogenism and ovulatory dysfunction. Given the heterogeneity of PCOS, treatment strategies increasingly focus on individualized and combined therapeutic approaches.

Objective: To evaluate the effects of personalized and combined treatment strategies, including lifestyle interventions and pharmacological therapy, on insulin resistance and reproductive function in women with polycystic ovary syndrome.

Methods: A prospective analytical study was conducted involving women of reproductive age diagnosed with PCOS according to the Rotterdam criteria. Participants received either lifestyle intervention alone or a combination of lifestyle modification and individualized pharmacological therapy. Insulin sensitivity was assessed using fasting insulin levels and the HOMA-IR index. Reproductive outcomes were evaluated by menstrual cycle characteristics, ovulatory function, and endocrine parameters before and after treatment.

Results: Patients receiving combined therapy demonstrated a more pronounced improvement in insulin sensitivity, reflected by a significant decrease in fasting insulin levels and HOMA-IR values. Restoration of regular menstrual cycles and ovulation occurred more frequently in the combined treatment group. Individualized therapeutic regimens were associated with improved hormonal balance and a reduction in clinical manifestations of hyperandrogenism.

Conclusion: Personalized and combined therapeutic strategies provide superior metabolic and reproductive benefits in women with PCOS compared to lifestyle intervention alone. These findings support the implementation of individualized treatment algorithms targeting both insulin resistance and reproductive dysfunction.

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Keywords

Polycystic ovary syndrome; individualized therapy; insulin resistance; lifestyle intervention; reproductive function.

1. Introduction

Polycystic ovary syndrome is among the most prevalent endocrine disorders affecting women of reproductive age and is associated with significant reproductive and metabolic consequences. The syndrome is characterized by chronic anovulation, androgen excess, and polycystic ovarian morphology, frequently accompanied by insulin resistance and compensatory hyperinsulinemia.

Insulin resistance plays a critical role in the pathophysiology of PCOS by enhancing ovarian androgen production and disrupting follicular development. These metabolic alterations not only impair fertility but also increase the risk of long-term complications, including type 2 diabetes mellitus and cardiovascular disease.

Due to the heterogeneity of clinical manifestations, standardized treatment approaches often fail to achieve optimal outcomes. Consequently, increasing attention has been directed toward individualized and combined therapeutic strategies that simultaneously address metabolic and reproductive abnormalities.

2. Aim of the Study

To analyze the impact of individualized and combined therapeutic approaches, incorporating lifestyle modification and pharmacological treatment, on insulin resistance and reproductive outcomes in women with polycystic ovary syndrome.

3. Materials and Methods

3.1 Study Design and Population

This study included women aged 18–40 years with a confirmed diagnosis of PCOS based on the Rotterdam criteria. All participants were evaluated prior to treatment initiation.

Women with other endocrine disorders, pregnancy, lactation, or recent use of hormonal or metabolic medications were excluded.

3.2 Therapeutic Strategies

Participants were assigned to treatment regimens based on clinical and metabolic profiles:

- Lifestyle-focused intervention: individualized dietary counseling, structured physical activity programs, and weight management strategies.
- Combined individualized therapy: lifestyle intervention supplemented with pharmacological agents selected according to metabolic and endocrine characteristics.

3.3 Evaluation of Insulin Resistance

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Metabolic assessment included fasting plasma glucose and insulin measurements. Insulin resistance was quantified using the Homeostasis Model Assessment for Insulin Resistance (HOMA-IR).

3.4 Assessment of Reproductive Function

Reproductive outcomes were evaluated through menstrual cycle regularity, ovulatory activity, and changes in hormonal parameters, including androgen and gonadotropin levels.

3.5 Statistical Analysis

Statistical analysis was performed using appropriate analytical methods. Results were presented as mean ± standard deviation. A value of $p < 0.05$ was considered statistically significant.

4. Results

Women receiving combined individualized therapy demonstrated a significantly greater reduction in insulin resistance compared to those undergoing lifestyle modification alone. Improvements in metabolic indices were observed regardless of baseline body mass index.

Reproductive outcomes improved in both groups; however, normalization of menstrual cyclicity and ovulatory function occurred more frequently in the combined therapy group. Hormonal analysis revealed a more substantial decrease in androgen levels and improved gonadotropin balance in patients receiving individualized pharmacological support.

5. Discussion

The results of this study confirm the central role of insulin resistance in the pathogenesis of PCOS and highlight the advantages of individualized and combined treatment strategies. While lifestyle modification remains a fundamental component of PCOS management, its combination with pharmacological therapy produces more consistent improvements in both metabolic and reproductive parameters.

The findings underscore the necessity of personalized treatment planning, taking into account metabolic status, reproductive goals, and clinical phenotype. Such an approach allows for more effective control of disease manifestations and may reduce the risk of long-term complications.

6. Conclusion

Individualized and combined therapeutic approaches significantly enhance insulin sensitivity and reproductive function in women with polycystic ovary syndrome. Integration of lifestyle modification with tailored pharmacological treatment represents an effective strategy for optimizing clinical outcomes and should be considered a key component of PCOS management.

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