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CASE REPORT

Nutritional therapy to support polycystic ovary syndrome management in preconception and pregnancy programs

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ABSTRACT

Polycystic ovary syndrome (PCOS) is a common endocrine disorder associated with infertility, obesity, and insulin resistance. This case report describes a 21-year-old woman with PCOS, primary infertility for 3.5 years, irregular menses, and obesity (BMI 31.3 kg/m2) who was referred to a pregnancy program and received combined management including pharmacotherapy (orlistat and vitamin D3), a calorie-restricted diet, and increased physical activity. After 3 months, she lost 6 kg, with reductions in body fat and visceral fat, and improved insulin resistance; she conceived in the 4th month and later delivered a healthy, term infant. These findings suggest that integrated nutritional therapy, together with pharmacological treatment and lifestyle modification, may support weight loss, improve metabolic parameters, and enhance pregnancy outcomes in women with PCOS, though controlled studies are needed to confirm efficacy and define optimal interventions.

1. Introduction

Polycystic ovary syndrome (PCOS) is an endocrine disorder of the female reproductive system characterised by menstrual irregularities, hyperandrogenism, and polycystic ovaries. Most women with PCOS are overweight or have central obesity, a phenotype strongly associated with insulin resistance that contributes to ovulatory dysfunction, infertility, and increased pregnancy risks. Weight reduction is a primary aim of nutritional therapy for PCOS; even a modest loss of 5–10% of initial body weight can substantially improve insulin sensitivity, ovulatory function, and hormonal balance (Faghfoori *et al.,* 2017; Papavasiliou & Papakonstantinou, 2017).

Effective management typically includes individualized calorie reduction, balanced macronutrient distribution (approximately 55% carbohydrates, 15% protein, 30% fat), increased dietary fiber (~32 g/day), regular physical activity, targeted micronutrient supplementation, and pharmacotherapy when indicated (Menteri Kesehatan RI, 2019). A multidisciplinary approach integrating nutritional therapy, exercise, and medical treatment has been shown to improve both metabolic and reproductive outcomes in women with PCOS; this case report underscores the role of such integrated care within pregnancy programs.

2. Case

A 21-year-old woman with a 3.5-year history of

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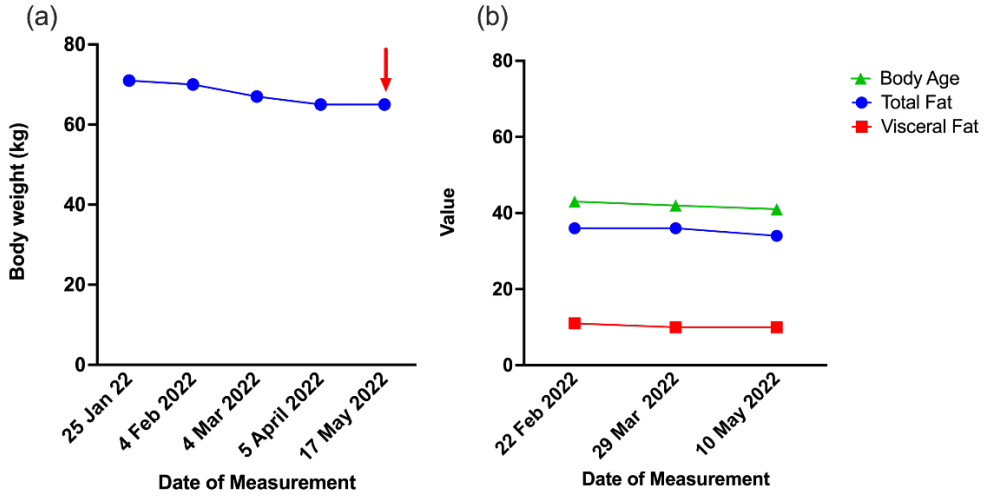

Figure 1. Changes in body weight (a), total fat, visceral fat, and estimated body age (b) during five months of nutritional therapy. Red arow shows the day whre the patient is getting pregnant

primary infertility and irregular menses was referred by an obstetrics–gynaecology specialist to the clinical nutrition clinic at RSI Sultan Agung Semarang for obesity management. She had been married for over three years. On initial assessment, the patient's weight was 70.5 kg, height 150 cm (BMI 31.3 kg/m^2), and vital signs were within normal limits. Body composition measured by bioelectrical impedance analysis (Omron Karada Scan HBF-375) showed increased fat mass relative to muscle mass, elevated visceral fat, and a resting metabolic rate of 1403 kcal/day. Waist–hip ratio exceeded 0.85, consistent with central obesity. Based on the Asia–Pacific BMI criteria, she was classified as class II obesity (World Health Organisation, 2000). BMI is obtained by dividing body weight (BB) by height squared (TB) or written as (BB/TB2) (World Health Organization, 2000).

The working diagnoses were PCOS, central obesity, and primary infertility.

Dietary assessment used a 24-hour recall covering three main meals, snacks, and physical activity. Findings indicated habitual consumption of fried foods (including fried chicken) and fried snacks (up to four portions daily), frequent sweetened tea, low vegetable intake, and fruit intake about once weekly. Estimated energy intake was 2,200–2,600 kcal/day.

Management and follow-up

The patient received an integrated nutrition and lifestyle program, along with pharmacotherapy. Nutritional counselling emphasised three main meals and two snacks daily, a 500 kcal/day energy deficit from baseline, and a macronutrient distribution of ~55% carbohydrate, 15% protein, and 30% fat. Dietary advice focused on reducing fried foods and sugary beverages and increasing vegetables and fruit. Physical activity recommendation was brisk walking for 30 minutes, three times per week. Pharmacotherapy included orlistat 120 mg, zinc 20 mg, and vitamin D3 2000 IU daily. The patient was scheduled for regular follow-up visits to monitor weight, waist circumference, and body composition.

Outcome

Figure 1 shows monthly measurements body weight (kg), total body fat (%), visceral fat level (BIA scale), and estimated "body age" (years) derived from Omron Karada Scan HBF-375. The figure illustrates a progressive decline in body weight (≈6 kg loss by month 3), reductions in total and visceral fat, and a decrease in estimated body age concurrent with the intervention. Clinical conception was achieved during the program (pregnancy confirmed by month 5). The pregnancy progressed to term (37 weeks), and she delivered a healthy female infant weighing 2890 g and 50 cm in length.

Discussion

Nutritional therapy for obese women with PCOS combines calorie reduction, increased physical activity, and pharmacotherapy to improve metabolic and reproductive outcomes. A weight loss of 5–10% of initial body weight is clinically meaningful, improving insulin sensitivity, restoring ovulation, regularising menses, and ameliorating hyperandrogenism, hirsutism, and dyslipidemia (Faghfoori *et al.,* 2017; Papavasiliou & Papakonstantinou, 2017). Weight loss targets are typically achieved by reducing energy intake by 500–1,000 kcal/day from habitual intake, individualised

according to patient needs (Faghfoori *et al.,* 2017).

Obesity is common in PCOS; approximately half of patients are classified as obese based on BMI measures (Wechselberg, 1967). In this case, the patient's BMI (31.3 kg/m^2) corresponds to class II obesity by Asia–Pacific criteria (World Health Organisation, 2000). Central adiposity—identified here by waist–hip ratio >0.85—is particularly relevant because it is closely linked to insulin resistance and cardiovascular risk (De, 2017; Porto *et al.,* 2018). Waist circumference should be measured at the midpoint between the iliac crest and the lowest rib per WHO/IDF guidance (Porto *et al.,* 2018).

Dietary prescription for PCOS emphasises energy restriction with preservation of nutrient quality: multiple small meals (3 main meals + 1–2 snacks), greater caloric intake earlier in the day, increased vegetables and fruit, low-fat dairy and lean protein, reduced refined/simple carbohydrates, and selection of complex, high-fibre carbohydrates (Kirschner, 2008). In this patient, a 500 kcal/day reduction to ~1,700 kcal/day was implemented with macronutrient distribution of ~55% carbohydrate, 15% protein, and 30% fat. Choosing low-glycemic, high-fibre carbohydrate sources—whole grains, legumes, and brown rice—supports glycemic control and insulin sensitivity (Faghfoori *et al.,* 2017). Protein (≈15% of energy) helps preserve lean mass during weight loss, while fats should emphasise unsaturated fatty acids, particularly MUFA and omega-3 PUFA, to reduce metabolic risk (Faghfoori *et al.,* 2017).

Sources of MUFA include avocado, canola, olives, and nuts; omega-3 PUFA are abundant in fatty fish (salmon, mackerel, sardines) and can be supplemented when dietary intake is inadequate. Two to three servings of fatty fish weekly can provide clinically relevant EPA/DHA; fish oil supplements are an alternative (Barber *et al.,* 2020). Increasing total fibre intake to ~32 g/day—via fruit, vegetables, and whole grains—may support weight reduction by promoting satiety and reducing meal frequency (Menteri Kesehatan Republik Indonesia, 2019; Barber *et al.,* 2020).

Caffeine and sugary beverage intake should be limited when targeting fertility; high caffeine intake has been associated with reduced conception rates (Wilcox *et al.*). Patients should prioritise water and meet recommended fluid intake (~2350 mL/day for women 19–29 years) (Menteri Kesehatan Republik Indonesia, 2019).

Micronutrient and adjunctive supplementation may be beneficial in PCOS. Vitamin D deficiency is common in PCOS and may contribute to insulin resistance and ovarian dysfunction; vitamin D supplementation has been associated with improvements in metabolic and hormonal parameters in some studies (Ngo *et al.,* 2011; Thomson *et al.,* 2012; Günalan *et al.,* 2018; Rahimi-Ardabili *et al.,* 2013; Bahadur *et al.,* 2022). Zinc status is frequently lower in PCOS; zinc supplementation has been reported to improve antioxidant status, insulin parameters, lipid profile, and androgen levels in some trials (Farhood, 2017; Nasiadek *et al.,* 2020; Abedini *et al.,* 2019). Folic acid and myo-inositol combinations improve metabolic and reproductive outcomes, reduce oxidative stress, and may enhance oocyte quality and reduce miscarriage risk (Rolland & Dewailly, 2015; Soufizadeh *et al.,* 2021). Calcium combined with vitamin D has also been shown to support weight loss, follicular maturation, menstrual regularity, and improvement in hyperandrogenism in PCOS (Firouzabadi *et al.,* 2012; Shojaeian *et al.,* 2019).

Orlistat, a gastrointestinal lipase inhibitor, reduces dietary fat absorption and, therefore, caloric intake; when used at 120 mg three times daily, together with dietary and lifestyle modifications, it can enhance weight loss (Qi, 2018; Grudén *et al.,* 2021). Adverse effects are primarily gastrointestinal and relate to unabsorbed fat; counselling on low-fat dietary habits is essential to optimise tolerability and effectiveness (Qi, 2018).

Physical activity is integral to management. Guidelines commonly recommend at least 150 minutes/week of moderate activity, with evidence that 60–75 minutes/day of moderate–vigorous exercise supports greater long-term weight loss (Farshchi *et al.,* 2007). Exercise modality should be individualised; aerobic exercise (e.g., brisk walking, cycling) promotes fat oxidation and cardiometabolic fitness, while resistance (anaerobic) training preserves or increases lean mass and metabolic rate (Hita, 2020). For this patient, gradual progression to 20–30 minutes of brisk walking three times per week was prescribed to support weight loss and reproductive goals.

Improvements in body composition and the device-estimated "body age" during therapy likely reflect enhanced metabolic efficiency and reduced cardiometabolic risk. Although single-case observations cannot establish causality, the combined approach of dietary energy restriction, macronutrient quality, structured physical activity, targeted supplementation, and adjunctive pharmacotherapy was temporally associated with weight loss, improved metabolic markers, and successful conception leading to term delivery in this patient.

Limitations include the single-case design, potential measurement variability from bioelectrical impedance, and the inability to isolate the independent effects of each intervention. Larger controlled studies are needed to determine the most effective combination

and intensity of nutritional, supplement, exercise, and pharmacologic strategies for PCOS patients in preconception and pregnancy programs.

Conclusions

Nutritional therapy is essential in supporting the success of pregnancy programs for women suffering from PCOS. Appropriate nutrition and pharmacotherapy help lower BMI, lipid profile and improve insulin resistance. This report describes a single case without a control group; therefore, the findings cannot be generalised to all PCOS patients. The observed improvements may also be influenced by other factors such as pharmacotherapy and lifestyle changes. Further studies with larger sample sizes and control groups are required to confirm the effectiveness of nutrition therapy in PCOS management during pregnancy programs.

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Conflict of interest

All authors have no conflict of interest in this article.

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