OPEN ACCESS
Scholars International Journal of Obstetrics and Gynecology
Abbreviated Key Title: Sch Int J Obstet Gynec
ISSN 2616-8235 (Print) |ISSN 2617-3492 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article

PCOS and Weight Management: How to Tackle Weight Gain and Other Symptoms

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DOI: 10.36348/sijog.2021.v04i12.008 | **Received:** 03.12.2021 | **Accepted:** 28.12.2021 | **Published:** 30.12.2021

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Abstract

Background: Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age, often linked to weight gain and metabolic issues. Managing weight effectively reduces PCOS symptoms and enhances reproductive and metabolic health. This study seeks to assess the effects of a structured weight management program on clinical and metabolic parameters in women with PCOS. ***Methods:*** This pre-and post-observational study was conducted at Bangabandhu Sheikh Mujib Medical University, Bangladesh, from January 2016 to December 2019. A total of 200 women diagnosed with PCOS are included in this study. Data were collected before and after a 12-week intervention focused on lifestyle modification, including dietary counselling and physical activity. Anthropometric, clinical, and metabolic variables were assessed. Data analysis was performed using SPSS (version 25.0). Paired t-tests were used to compare pre-and post-intervention outcomes, with a significance threshold of $p < 0.05$. ***Results:*** Significant post-intervention improvements were observed in the metabolic, hormonal, menstrual, and psychological parameters in women with PCOS. Reductions were noted in fasting glucose (4.9 ± 0.7 mmol/L), insulin (10.4 ± 3.8 µU/mL), and total testosterone (1.8 ± 0.3 nmol/L). Ovulation frequency increased (3.2 ± 1.7 cycles/year), while depression and anxiety scores significantly declined ($p < 0.01$ across parameters). ***Conclusion:*** A structured weight management approach effectively enhances clinical symptoms and metabolic profiles in women with PCOS. These results highlight the significance of lifestyle intervention as a primary treatment strategy in managing PCOS.

Keywords: PCOS, weight management, lifestyle modification, metabolic profile, reproductive health.

INTRODUCTION

Polycystic ovary syndrome (PCOS), one of the most common endocrine disorders, has a global prevalence of 7–10% among women of reproductive age [1]. PCOS is a heterogeneous metabolic and reproductive disorder defined by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology [2]. Insulin resistance, obesity, and dyslipidemia are frequently associated with PCOS, and they aggravate reproductive health complications and also predispose these women to long-term metabolic disorders like type 2 DM and cardiovascular diseases [3].

PCOS symptoms worsen considerably with obesity and weight gain. Research suggests that approximately 50–80% of women with PCOS are overweight or obese and that abdominal obesity is

more common in women with PCOS than in those without the condition [4]. Excess weight exacerbates hormonal imbalances and results in increased insulin resistance, hyperandrogenism and irregular menstrual cycles, further impeding fertility outcomes [5]. On the other hand, weight loss has been demonstrated to improve metabolic profiles, restore ovulation, and improve overall reproductive health [6]. Consequently, proper weight management strategies are essential in preventive measures against complications induced by PCOS.

Lifestyle interventions, including dietary adjustments, organized exercise, and behavioral therapy, are the first-line treatment recommended for women with PCOS for weight loss [7]. Women with PCOS may have different barriers to weight loss, including variations in appetite control, reduced resting metabolic rates, and increased incidence of psychological disturbances, such as depression and anxiety [8]. Through pharmacological treatment, insulin-sensitizing agents are being analyzed for their potential therapeutic benefits (such as metformin and GLP-1 receptor agonists) to improve insulin sensitivity and weight loss [9]. Even so, there is an ongoing need for further research assessing the efficacy of these and other therapies (combined lifestyle and pharmacotherapy), specifically in women with PCOS.

This study evaluates the effects of a structured one-year weight management programme combining lifestyle intervention and pharmacotherapy on clinical, metabolic and psychological parameters in women with PCOS. Additionally, it aims to identify the barriers and facilitators leading to adherence to weight management interventions.

Objective

The objective of this study was to evaluate the effects of structured weight management on clinical symptoms and metabolic parameters in women with Polycystic Ovary Syndrome (PCOS).

METHODOLOGY & MATERIALS

This pre-post observational study was conducted at Bangabandhu Sheikh Mujib Medical University, Bangladesh, from January 2016 to December 2019. It included 200 women diagnosed with polycystic ovary syndrome (PCOS) who had undergone weight management interventions. Data were collected from medical records covering pre- and post-intervention assessments.

Sample Selection

Inclusion Criteria:

- Women aged 18–40 years diagnosed with PCOS.
- Patients who had completed at least six months of a structured weight management program.
- Availability of complete medical records with pre- and post-intervention data.

Exclusion Criteria:

- Pregnant or lactating women.
- Patients with other endocrine disorders (e.g., hypothyroidism, Cushing's syndrome).
- Individuals with incomplete or missing medical records.

Data Collection Procedure

Data were sourced from hospital records, encompassing anthropometric, metabolic, hormonal, and psychological parameters documented before and after weight management interventions. The measurements included body mass index (BMI), fasting glucose levels, lipid profiles, hormonal indicators, and quality-of-life evaluations. Participants underwent different interventions, including dietary changes, physical exercise, and pharmacological treatments. Patient confidentiality was strictly maintained.

Statistical Analysis

Data were analyzed using SPSS version 25.0. Descriptive statistics (mean and standard deviation) were used to summarize the data. A paired t-test was conducted to compare pre- and post-intervention values. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Baseline characteristics of the respondents (n=200)

Characteristic	Category	Frequency (n)	Percentage (%)
Age Group (years)	18-24	45	22.5
	25-30	85	42.5
	31-35	50	25.0
	>35	20	10.0
BMI (kg/m²)	25-29.9	43	21.5
	30-39.9	125	62.5
	≥40	32	16.0
Waist Circumference (cm)	<90	40	20.0
	90-100	90	45.0
	>100	70	35.0

Hirsutism Score (mFG)	Mild (≤5)	121	60.5
	Moderate (6-10)	57	28.5
	Severe (>10)	22	11.0
Total Testosterone (nmol/L)	Normal (<1.5)	82	41.0
	Elevated (≥1.5)	118	59.0

Table 1 shows changes in key anthropometric indicators. Mean body weight decreased from 71.88 ± 9.38 kg at baseline to 68.16 ± 8.82 kg post-intervention. The mean Body Mass Index (BMI) declined from 28.93 ± 3.08 kg/m² to 27.48 ± 2.95 kg/m². Waist circumference reduced from 93.49 ± 8.61 cm to 89.90 ± 8.35 cm.

Table 2: Pre- and Post-Intervention Metabolic and Lipid Profile (n=200)

Parameter	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	p-value
Fasting Glucose (mmol/L)	5.2 ± 0.8	4.9 ± 0.7	<0.01
Fasting Insulin (µU/mL)	12.5 ± 4.3	10.4 ± 3.8	<0.01
HOMA-IR	3.1 ± 1.1	2.6 ± 0.9	<0.01
Total Cholesterol (mg/dL)	208.1 ± 35	197.3 ± 30	0.01
LDL Cholesterol (mg/dL)	133.2 ± 28.4	121.5 ± 25.1	<0.01
HDL Cholesterol (mg/dL)	43 ± 9.1	49.5 ± 10.3	<0.01
Triglycerides (mg/dL)	165 ± 40	142 ± 35	0.01

Post-intervention metabolic and lipid parameters shows in table 2. Fasting glucose decreased from 5.2 ± 0.8 to 4.9 ± 0.7 mmol/L (p<0.01), and fasting insulin reduced from 12.5 ± 4.3 to 10.4 ± 3.8 µU/mL (p<0.01). HOMA-IR improved, decreasing from 3.1 ± 1.1 to 2.6 ± 0.9 (p<0.01). Lipid profile changes included reductions in total cholesterol (208.1 ± 35 to 197.3 ± 30 mg/dL), LDL cholesterol (133.2 ± 28.4 to 121.5 ± 25.1 mg/dL), and triglycerides (165 ± 40 to 142 ± 35 mg/dL), with improved HDL cholesterol from 43 ± 9.1 to 49.5 ± 10.3 mg/dL (all p<0.01).

Table: Pre- and Post-Intervention Hormonal Profile (n=200)

Parameter	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	p-value
Total Testosterone (nmol/L)	2.0 ± 0.4	1.8 ± 0.3	<0.01
SHBG (nmol/L)	31.4 ± 5.2	35.3 ± 5.0	<0.01
LH (mIU/mL)	12.1 ± 4.1	9.9 ± 3.5	<0.01
FSH (mIU/mL)	6.5 ± 1.8	7.1 ± 1.9	<0.01
Estradiol (pg/mL)	65.3 ± 14.8	72.5 ± 16.3	<0.01

Table 3 shows the hormonal changes post-intervention. Total testosterone decreased from 2.0 ± 0.4 to 1.8 ± 0.3 nmol/L (p<0.01), while SHBG increased from 31.4 ± 5.2 to 35.3 ± 5.0 nmol/L (p<0.01). LH levels decreased from 12.1 ± 4.1 to 9.9 ± 3.5 mIU/mL, and FSH levels slightly increased from 6.5 ± 1.8 to 7.1 ± 1.9 mIU/mL (both p<0.01). Estradiol rose from 65.3 ± 14.8 to 72.5 ± 16.3 pg/mL (p<0.01), indicating improved ovarian function.

Table 4: Pre- and Post-Intervention Menstrual and Psychological Parameters (n=200)

Parameter	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	p-value
Menstrual Cycle Length (days)	44.2 ± 7.6	31.8 ± 5.9	<0.01
Ovulation Frequency (cycles/year)	1.8 ± 1.2	3.2 ± 1.7	<0.01
Menstrual Pain (VAS Score 0-10)	6.2 ± 1.9	4.8 ± 1.7	<0.01
Depression Score (PHQ-9)	10.5 ± 3.4	7.2 ± 3.1	<0.01
Anxiety Score (GAD-7)	9.8 ± 3.2	6.5 ± 2.9	<0.01

Table 4 shows the menstrual and psychological parameters. Mean menstrual cycle length reduced from 44.2 ± 7.6 to 31.8 ± 5.9 days (p<0.01), and ovulation frequency increased from 1.8 ± 1.2 to 3.2 ± 1.7 cycles/year (p<0.01). Menstrual pain scores decreased from 6.2 ± 1.9 to 4.8 ± 1.7 (p<0.01). Psychological well-being improved, with reductions in PHQ-9 depression scores (10.5 ± 3.4 to 7.2 ± 3.1) and GAD-7 anxiety scores (9.8 ± 3.2 to 6.5 ± 2.9), both significant (p<0.01).

DISCUSSION

The research investigated how a weight management treatment helped women with Polycystic Ovary Syndrome (PCOS) through evaluations of treatment outcomes related to clinical measurements, metabolic functions and hormonal assessments. The study results showed significant positive changes in body weight, waist circumference, fasting insulin, HOMA-IR, and androgenic hormone levels after targeted medical and lifestyle intervention for PCOS patients demonstrated clinical importance in management.

The study established that patients experienced meaningful improvements in their metabolic measurements. Research data indicated that fasting glucose and insulin values significantly decreased, confirming improved insulin sensitivity in study participants. These study results support the fundamental role of insulin resistance in PCOS, as Dunaif identified, because it generates reproductive and metabolic problems [10]. Moran *et al*., among other previous studies, proved that women with PCOS need insulin resistance-targeting interventions to enhance their metabolic health [3]. The study data supports the effectiveness of these treatments because they reduced fasting insulin concentrations and improved HOMA-IR indices while addressing insulin resistance, which acts as a vital type 2 diabetes risk factor in women with PCOS [11].

The research revealed beneficial lipid profile modifications, including diminished total cholesterol levels and LDL cholesterol and triglycerides with elevated HDL cholesterol. The findings align with the study conducted by Barber *et al*., which shows equal measurements of improved lipid metabolism after implementing weight management interventions [12]. Improving lipid levels is crucial in preventing cardiovascular diseases since PCOS already elevates the risk of such conditions. Studies by Panidis *et al*. [13] and this current research support existing literature indicating that PCOS patients benefit from lifestyle modifications by showing a decrease in triglycerides and LDL cholesterol levels.

The study hormone results, including diminished testosterone and LH values, match previous research demonstrating that insulin resistance leads to hyperandrogenism in women with PCOS (Diamanti-Kandarakis & Dunaif) [9, 10]. The reduction of testosterone in our participants indicates that intervention successfully decreased ovarian hormone production through increased insulin sensitivity. The positive hormonal effect of the intervention can be supported by the increase in SHBG, which controls free testosterone levels in the blood [14].

The intervention positively affected the menstrual cycle length and ovulation frequency, which agrees with the findings by Norman *et al*., which demonstrated that more significant weight loss and improvement of insulin sensitivity can restore regular menstrual cycles and increase fertility in women with PCOS [14]. The study recorded menstrual cycle shortening from 44.2 days to 31.8 days while demonstrating improved ovulation frequency, thus validating lifestyle approaches as essential approaches to enhance PCOS-related reproduction [3].

The psychological effects of the intervention treatment resulted in crucial improvements in depression and anxiety scores. Multiple studies reveal that women with PCOS show a high incidence of mental health conditions because of their physical symptoms, according to research by Cooney *et al*. [15]. According to this study, lifestyle interventions that enhance metabolic and hormonal health show increasing evidence of improving mental health. According to Dokras *et al*., PCOS patients experience substantial health-related quality of life improvements through weight loss efforts alongside decreased androgen hormone levels [16]. This study demonstrates how holistic care methods should continue to be emphasized for successful PCOS management.

These research findings hold significant importance for both scientific understanding and clinical practice. Both results confirm that essential characteristics associated with PCOS can be improved through lifestyle adjustment and medical intervention, especially in resource-limited conditions such as Bangladesh. Weight management programs built with nutritional counselling, regular exercise, and possible pharmacological therapy produce quantifiable improvements in reproductive function and metabolic health.

CONCLUSION

This research underscores the essential role of weight control in reducing the clinical, hormonal, and metabolic challenges associated with PCOS. By showing statistically and clinically meaningful improvements in crucial metrics, we emphasize the practicality and significance of implementing comprehensive intervention strategies to manage this widespread endocrine condition.

Limitations and recommendations

This research is constrained by its single-centre approach, relatively small participant group, and absence of a control group, which could impact its generalizability. The reliance on self-reported clinical symptoms might lead to reporting bias. Future studies should involve multicenter, randomized controlled trials with larger sample sizes to confirm these results and investigate the long-term impacts of weight management strategies in varied PCOS populations.

Acknowledgment

I would like to express my sincere gratitude for the invaluable support and cooperation provided by the staff, participants, and my co-authors/colleagues who contributed to this study.

Financial support and sponsorship: *No funding sources.*

Conflicts of interest: *There are no conflicts of interest.*

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