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Improving health outcomes through a strength training and yoga program for young women with PCOS: A quality improvement project

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Abstract

Background: Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder associated with physical, mental, and reproductive health challenges. Lifestyle interventions, including exercise and yoga, have shown promise in managing PCOS symptoms. This quality improvement project aimed to assess the impact of a combined strength training and yoga program on the health outcomes of young women with PCOS.

Methods: The 13-month program (December 2021 to January 2023) was conducted in a community setting. Participants were young women diagnosed with PCOS, selected based on predefined inclusion criteria. The intervention included bi-weekly strength training and yoga sessions, supplemented by group discussions and motivational coaching. Primary outcomes included weight loss, BMI reduction, mental health improvement (measured by PHQ-9 and GAD-7 scores), and menstrual regularity. Adherence and participation rates were tracked to evaluate engagement.

Results: The average weight loss among participants was 5.2 ± 2.4 kg, with BMI reduced from 29.1 ± 3.2 kg/m^2 to 26.8 ± 2.9 kg/m^2. PHQ-9 depression scores decreased from 12.3 ± 4.5 to 6.4 ± 3.2, and GAD-7 anxiety scores improved from 10.6 ± 3.7 to 5.8 ± 2.9. Menstrual regularity improved, with 75% of participants reporting regular cycles by the end of the program. 82% of participants completed at least 70% of the sessions, indicating strong adherence.

Conclusion: The combined strength training and yoga program effectively improved physical, mental, and reproductive health outcomes among young women with PCOS. High adherence rates demonstrated the feasibility of this approach, emphasizing the importance of lifestyle interventions in managing PCOS. Future efforts should focus on scaling the program and integrating nutrition-based strategies for even better outcomes.

Keywords: PCOS; Strength Training; Yoga; Lifestyle Intervention

1. Introduction

Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting approximately 6–12% of women of reproductive age [1]. It is characterized by a range of symptoms, including irregular menstrual cycles, hyperandrogenism (elevated male hormones), polycystic ovarian morphology, and insulin resistance [2]. Women with PCOS often experience complications such as infertility, obesity, and an increased risk of type 2 diabetes, cardiovascular diseases, and mood disorders, including anxiety and depression [3]. Additionally, PCOS impacts emotional well-being, contributing to reduced quality of life and heightened psychological distress [4].

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Given the complex nature of PCOS, which involves metabolic, reproductive, and psychological dimensions, lifestyle interventions have become a cornerstone of its management [5]. Guidelines recommend that non-pharmacological measures such as weight management, regular exercise, and dietary modifications play an essential role in alleviating symptoms [6]. Strength training and aerobic exercises have been shown to improve insulin sensitivity, reduce androgen levels, and promote weight loss [7]. Additionally, mind-body practices such as yoga can positively influence mental well-being and hormonal balance [7]. Yoga, with its emphasis on breath control and mindfulness, has demonstrated benefits in reducing cortisol levels, improving mood, and promoting menstrual regularity in women with PCOS [8]. Combining strength training with yoga offers a holistic approach, targeting both the physical and psychological challenges posed by PCOS [9].

The decision to combine strength training and yoga stemmed from their complementary benefits. Strength training enhances muscle mass, improves metabolism, and supports weight reduction, all of which are crucial for managing insulin resistance—a core feature of PCOS [10]. On the other hand, yoga offers stress relief, improves emotional well-being, and addresses the hormonal imbalances that often exacerbate PCOS symptoms [11]. The synergy between these two interventions aims to optimize both physical health and mental well-being, providing participants with sustainable lifestyle tools. Despite the well-documented benefits of lifestyle interventions, many young women with PCOS experience barriers to accessing structured exercise programs, including a lack of tailored fitness solutions and limited awareness of holistic practices [12]. Furthermore, traditional care models tend to focus predominantly on pharmacological treatment, neglecting the psychosocial aspects of the condition [13]. This project aimed to bridge these gaps by offering a structured strength training and yoga program tailored specifically to the needs of young women with PCOS. The primary aim of this project was to improve the quality of life and health outcomes for young women diagnosed with PCOS through the implementation of a combined strength training and yoga program conducted between December 2021 and January 2023.

2. Methods

2.1. Project Design

This quality improvement project followed the Plan-Do-Study-Act (PDSA) framework to ensure iterative improvement throughout the intervention period. The PDSA cycle allowed us to test the effectiveness of combining strength training and yoga in managing PCOS, monitor progress, and make adjustments based on participant feedback and outcomes at key intervals.

2.2. Setting

The intervention was conducted in a community fitness center equipped with strength training facilities and a dedicated space for yoga sessions. This venue provided a supportive and accessible environment for participants to engage in both physical and mental wellness activities.

2.3. Participants

2.3.1. Inclusion Criteria

- Women aged 18–35 years
- Clinically diagnosed with PCOS based on the Rotterdam criteria
- Willing to participate in the entire 13-month program (December 2021 to January 2023)
- Able to engage in moderate physical activity

2.3.2. Exclusion Criteria

- Presence of severe cardiovascular or orthopedic conditions limiting physical activity
- Current use of anti-androgenic or hormonal therapy initiated within three months prior to the program
- Pregnant women or those planning pregnancy during the intervention period

2.4. Intervention

The program consisted of a combination of strength training and yoga sessions, designed to improve both physical and psychological outcomes for participants.

2.4.1. Strength Training Program

- Frequency: 3 sessions per week
- Duration: 60 minutes per session
- Intensity: Progressive resistance training, starting at 50–60% of participants' 1-repetition maximum (1RM) and gradually increasing to 70–80%.
- Exercises: Compound exercises such as squats, deadlifts, bench press, and upper-body resistance work.

2.4.2. Yoga Program:

- Frequency: 2 sessions per week
- Duration: 60 minutes per session
- Style: Focused on Hatha yoga and restorative practices, including breathing exercises (pranayama) and mindfulness meditation.
- Goal: Enhance emotional regulation, reduce stress levels, and improve menstrual regularity through relaxation techniques.

Additional Support Provided:

- Dietary counseling: Participants received guidance on balanced nutrition for managing insulin resistance.
- Progress tracking tools: Each participant was provided with a fitness tracker to monitor daily steps, activity levels, and heart rate.
- Ongoing motivation and adherence support: Weekly group discussions and motivational coaching sessions were organized to address challenges and promote consistency.

2.5. Measurement Strategy

2.5.1. Primary Outcome Measures

- BMI: Weight and height were measured monthly to assess changes in body composition.
- Menstrual regularity: Tracked using self-reported menstrual calendars.
- Mental well-being: Assessed using the PHQ-9 (Patient Health Questionnaire) for depression and GAD-7 (Generalized Anxiety Disorder) for anxiety.

2.5.2. Secondary Outcome Measures

- Waist-to-hip ratio: Measured at baseline, midpoint, and end of the program.
- Insulin sensitivity: Monitored through fasting blood glucose and insulin levels at baseline and completion.
- Quality of life: Evaluated using the PCOS Health-Related Quality of Life Questionnaire (PCOSQ).

2.5.3. Tools Used

Fitness trackers to monitor physical activity levels and heart rate

Self-report questionnaires (PHQ-9, GAD-7, and PCOSQ) administered at baseline, midpoint, and end of the intervention

2.6. Ethical Considerations

The project adhered to ethical guidelines for research involving human participants. Ethical approval was obtained from the local institutional review board (IRB) prior to project implementation. All participants provided written informed consent before enrolling in the program. They were informed about the voluntary nature of participation, the potential benefits and risks, and their right to withdraw at any point without penalty. Participant data was anonymized, and only authorized personnel had access to the collected data. Secure systems were used to store all data to ensure privacy.

3. Results

The results of the 13-month quality improvement program showed significant improvements in physical health, mental well-being, and menstrual regularity among participants. In addition to health outcomes, the program demonstrated strong adherence rates, underscoring the feasibility and acceptability of combining strength training and yoga for young women with PCOS. Participants experienced notable changes in physical health over the course of the intervention. The average weight loss was 5.2 ± 2.4 kg, with a reduction in BMI from 29.1 ± 3.2 kg/m^2 to 26.8 ± 2.9 kg/m^2, indicating a

shift toward a healthier weight range. This outcome aligns with the intended goal of reducing obesity and promoting weight management in women with PCOS.

The program also yielded significant improvements in mental health. At baseline, participants had an average PHQ-9 score of 12.3 ± 4.5, indicating moderate depression. By the end of the intervention, this score decreased to 6.4 ± 3.2, reflecting mild depressive symptoms. Similarly, GAD-7 anxiety scores improved from 10.6 ± 3.7 (moderate anxiety) to 5.8 ± 2.9 (mild anxiety). These findings highlight the effectiveness of incorporating yoga and mindfulness practices to manage emotional health.

Menstrual health outcomes improved markedly over the course of the program. Initially, only 35% of participants reported regular menstrual cycles (≤35 days). By the conclusion of the intervention, 75% participants achieved regular cycles, with some also reporting improvements in ovulation, as confirmed through ovulation predictor kits. The program demonstrated strong adherence, with 82% of participants completing at least 70% of the scheduled strength training and yoga sessions. Weekly group discussions and motivational coaching sessions were well-received, with a 90% attendance rate, suggesting that the additional support elements fostered participant engagement. Despite these successes, the dropout rate was 18%, primarily due to relocation or scheduling conflicts, indicating that logistical challenges remained a barrier for some participants.

Comparative analysis with baseline data revealed considerable progress across multiple domains. At the beginning of the program, participants were generally overweight or obese, with an average BMI of 29.1 kg/m^2. After 13 months, 70% of participants achieved a reduction of at least 2 kg/m^2 in BMI, reflecting sustainable weight loss and improved physical health. Mental health scores also improved steadily. Notably, the greatest reductions in PHQ-9 and GAD-7 scores were observed after six months, coinciding with participants' increased familiarity with yoga and mindfulness practices.

Menstrual health outcomes exhibited a marked shift from baseline, where 65% participants experienced irregular cycles. By the end of the intervention, 40% of these individuals reported achieving regular menstrual cycles for the first time in years, suggesting that the combined intervention had a positive effect on reproductive health.

Table 1 Summary of Key Outcomes at Baseline and End of Intervention

Outcome	Baseline	End of Intervention	% Change
Weight (kg)	76.8 ± 12.5	71.6 ± 11.2	-6.8%
BMI (kg/m^2)	29.1 ± 3.2	26.8 ± 2.9	-7.9%
PHQ-9 (Depression Score)	12.3 ± 4.5	6.4 ± 3.2	-48.0%
GAD-7 (Anxiety Score)	10.6 ± 3.7	5.8 ± 2.9	-45.3%
Regular Menstrual Cycles	35%	75%	+40%

4. Discussion

The results of this quality improvement program provide valuable insights into the effectiveness of combining strength training and yoga to improve health outcomes in young women with PCOS. The program successfully met its primary objective of improving the physical, mental, and reproductive health of participants. The significant reductions in weight and BMI underscore the role of regular physical activity in weight management for women with PCOS. Additionally, the improvement in mental health, reflected by lower PHQ-9 and GAD-7 scores, suggests that the integration of yoga not only provided physical benefits but also alleviated symptoms of anxiety and depression. A noteworthy outcome was the marked improvement in menstrual regularity, with 75% of participants reporting regular cycles by the end of the intervention. This aligns with the known benefits of exercise in regulating insulin levels and hormonal balance, both of which are critical in managing PCOS. Furthermore, the high adherence rate of 82% suggests that the combination of strength training, yoga, and motivational support was well-received by participants and feasible over the 13-month period.

The findings of this study align with existing research on the benefits of exercise for PCOS management. Previous studies have shown that strength training improves insulin sensitivity and promotes weight loss, both essential for managing PCOS-related metabolic dysfunction [14, 15]. Yoga has also been identified as an effective intervention for reducing

stress, improving mood, and enhancing reproductive health in women with PCOS [16]. For instance, randomized trials have demonstrated that yoga reduces cortisol levels and improves ovulation, similar to the menstrual improvements observed in this program [17, 18]. Our results add to the growing body of literature by showing that a combined intervention—focusing on both physical activity and mindfulness—can deliver comprehensive health benefits for women with PCOS. These findings are consistent with other lifestyle intervention programs, though they emphasize the added value of yoga in addressing both mental and reproductive health challenges.

Several lessons emerged from implementing this program. One key challenge was ensuring consistent participation over 13 months. Although adherence rates were generally high, managing participant schedules was complex, especially for those with competing personal and academic commitments. Offering flexible session times and incorporating group support sessions helped mitigate dropout rates and foster engagement. Another challenge was the need for individualized coaching to accommodate participants with varying fitness levels. Some participants required modifications to their strength training routines, which was managed through close monitoring and tailored programming by fitness trainers. This personalized approach was instrumental in maintaining motivation and preventing injuries.

This project had several limitations. The sample size was relatively small, which may limit the generalizability of the findings. A larger cohort could provide more robust data on the intervention's effectiveness across different demographic groups. Additionally, the follow-up period was restricted to the 13-month program duration. Longer follow-up would be beneficial to determine the sustainability of the health benefits observed and whether participants maintained lifestyle changes after the program ended. Another limitation was the reliance on self-reported menstrual data, which may introduce recall bias. Future studies could benefit from using more objective tools, such as hormone assays, to track reproductive outcomes more accurately. Finally, while the program provided dietary counseling, nutrition-related outcomes were not formally assessed, leaving a gap in understanding how diet may have contributed to the observed health improvements.

List of Abbreviations

- PCOS: Polycystic Ovary Syndrome
- BMI: Body Mass Index
- PHQ-9: Patient Health Questionnaire-9
- GAD-7: Generalized Anxiety Disorder-7
- PDSA: Plan-Do-Study-Act

5. Conclusion and Sustainability

The strength training and yoga program demonstrated substantial improvements in the physical, mental, and reproductive health of young women with PCOS. Participants experienced significant weight loss, BMI reduction, and enhanced menstrual regularity. Mental health outcomes also improved, with notable reductions in anxiety and depression scores. High adherence and participation rates reflected the acceptability of the program, emphasizing the feasibility of combining physical activity, mindfulness practices, and group support for managing PCOS. Given the program's success, several next steps have been identified for scaling and sustaining its impact. First, plans are underway to expand the program to accommodate more participants by offering additional group sessions and flexible scheduling options. Partnering with community gyms, clinics, and wellness centers will also enable broader outreach. Additionally, an online component may be developed, including virtual yoga classes and fitness tracking tools, to engage participants who may face geographical or time-related barriers. To ensure the sustainability of the program, it is essential to continue fostering a supportive community among participants. Follow-up workshops and periodic wellness check-ins will help reinforce lifestyle changes. Establishing partnerships with healthcare providers will further integrate the program into routine PCOS care, ensuring that it becomes a lasting resource for women managing this condition.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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