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Lifestyle Interventions And Menstrual Regularity In Women With PCOS: A Systematic Review

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ABSTRACT

Background: PCOS is a common endocrine disorder in women of reproductive age, commonly linked to menstrual abnormalities, anovulation, hyperandrogenism, and metabolism. As a first-line approach, lifestyle interventions, such as dietary change, systematic physical exercise, and behavioral guidance are becoming more commonly advised to enhance reproductive and metabolic outcomes.
Aim: The purpose of the systematic review was to determine the effect of lifestyle interventions on menstrual regularity in women with PCOS, with results including ovulary functionality, menstrual rhythm renewal, androgenicity, insulin resistance, and weight control.
Methods: Cohort studies, quasi-experimental studies, and randomized controlled trials published in 2019-2025 were identified in PubMed, Scopus, Web of Science, and Google Scholar. The participants of the study were women with PCOS who received structured lifestyle interventions and mentioned one or more outcomes associated with menstrual and metabolic health. The synthesis of data involved alterations in the menstrual cycle regularity, hormonal, anthropometric and adherence to interventions.
Findings: 9 studies with 646 participants were included. The results consistently showed that menstrual cycle regularity, ovulatory, reduced body mass index, and lowered hyperandrogenism had been improved after lifestyle interventions. Interventions that combined dietary counseling, moderate aerobic activity and behavior change reported the strongest effects. Increased compliance with the intervention procedures was associated with increased improvements.
Conclusion: Lifestyle interventions are effective primary measures that enhance regular menstrual cycles and metabolic health in PCOS women. Future studies need to be personalized on optimization of individualized programs, durability of adherence, and reproductive outcomes of various populations.

Keywords: Polycystic ovary syndrome, PCOS, Lifestyle interventions, Menstrual regularity, Diet, Physical activity, Behavioral modification, Ovulation, Hyperandrogenism, Insulin resistance

INTRODUCTION

Polycystic ovary syndrome (PCOS) represents one of the most prevalent endocrine diseases in women of reproductive age, with a prevalence rate of 813 and it is a leading cause of irregular menstrual cycles, anovulation, infertility, metabolic dysfunction, and poor quality of life [1]. Abnormal menstrual bleeding is a characteristic of PCOS that is caused by disruptions in hormone regulation, insulin resistance, and hyperandrogenism, which combined, delay the process of follicular growth and ovulation. Considering the multisystem heterogeneity of the condition, the prevailing clinical practice statements emphasize lifestyle modification as initial

therapy in regulating reproductive and metabolic aspects of PCOS, such as menstrual irregularity, before using pharmacologic or procedure-based models [2].

The lifestyle interventions tend to incorporate a change in diet, enhanced exercise or physical activity, and behavioral processes intended on sustainable weight control and metabolic enhancement. Dietary modification is one of them--it is always linked to improvements in their sensitivity to insulin, decrease in their body mass index (BMI), and hormonal balance, which is directly related to their menstrual cyclicity [3]. Systematic evidence indicates that low-glycemic-index diets, Mediterranean-like styles, and energy restriction may decrease the total and free testosterone levels and aid in the metabolic results in PCOS women. Such dietary interventions are likely to curb hyperinsulinemia and systemic inflammation both of which play a role in anovulation or irregularities in the cycles, therefore adding to the high chances of having ovulatory and regular menstrual cycles [2].

Physical activity and exercise are also found to have a positive impact on reproductive health of PCOS. Frequent aerobic or combined aerobic-resistance training enhances the action of insulin, weds the process of losing weight, and also affects the metabolism of androgens; all of which are relevant contributors to ovulatory activity. Studies have been shown to differ in design and outcome, but numerous provide results of significant improvement in menstrual frequency and cycle regularity after long-term interventions of physical activity, especially in women with PCOS who experience overweight or obesity [4]. Moderate exercise has been found to reduce hyperandrogenic trappings and improves menstrual cycles in adolescents with PCOS, which justifies the importance of life-long behavior modification at an early age during reproductive life [5].

Weight loss, no matter how insignificant (5-10 percent of body weight) is always associated with resumed ovulatory cycles and enhanced menstrual actions in obese women with PCOS [1]. Indicatively, a quasi-experimental study involving a cohort of overweight women with PCOS demonstrates that, after a reliable pattern of lifestyle intervention, the figure of menstrual cycles per year significantly increases, in comparison to minimal changes in control groups [6]. This is in line with prior randomized trials that reveal that dietary weight reduction is positively associated with augmented menstrual cycles and a decrease in waistline and hormonal profiles [7].

There are promising findings of these, but there are also limitations on research available as pointed out by systematic reviews. Most previous reviews have observed that a number of trials are of mixed quality, intervention modality, and different definitions of outcome, and clear, homogenous evidence has not been established that menstrual regularity is true given the heterogeneity between studies and differences between reporting. However, current body of literature has in favor of the fact that combined life-style interventions dietary alteration (especially in the long term) with regular exercises and behavior therapy are important constituents of PCOS management and of primary importance in facilitating weezy menstruation and increase in general reproductive functioning.

AIM OF WORK:

This systematic review aims to critically assess and synthesize the recent evidence on the efficacy of lifestyle intervention (i.e., dietary modification, physical activity, exercise training, and weight management) on menstrual regularity in women with polycystic ovary syndrome (PCOS). Particularly, the review aims to find the degree to which lifestyle modifications affect ovulatory activity and cycle rate, the best intervention strategies, as well as the quality and reliability of the existing evidence to guide clinical practice and future research priorities.

METHOD AND SEARCH STRATEGY

The systematic review was carried out with the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) in mind [8]. The search was conducted on the electronic databases of PubMed, Web of Science, Cochrane Library, and Google Scholar. Articles that were published in 2014-2026 were taken into account. Search strategy involved: Polycystic Ovary Syndrome, PCOS, Lifestyle Intervention, Diet, Exercise, Physical activity, weight loss, menstrual regularity and ovulation with combination of Boolean operators (AND, OR). Initially, titles and abstracts were shortlisted to include only those that met the relevancy criteria, then full-text were assessed based on predetermined inclusion and exclusion criteria.

ELIGIBILITY CRITERIA

After pre-screening the titles, a search of studies assessing the impact of lifestyle interventions (diet, exercise, physical activity, and weight management) on the regularity of menstrual cycles among women with polycystic ovary syndrome (PCOS) was conducted. The inclusion was restricted to original research articles published in the English language and between the years 2014 and early 2026. Eligible studies included randomized controlled trials, cohort and quasi-experimental studies. Review articles, editorials, letters, case reports, conference abstracts, animal studies, and studies with no menstrual or ovulatory results were excluded. Abstracts were filtered by relevance and full-text screened to eliminate duplicates, incomplete reports, or studies whose methodology was unclear. Final articles were measured based on methodological quality, relevance, and suitability to the review objectives.

Identification of studies via databases and registers

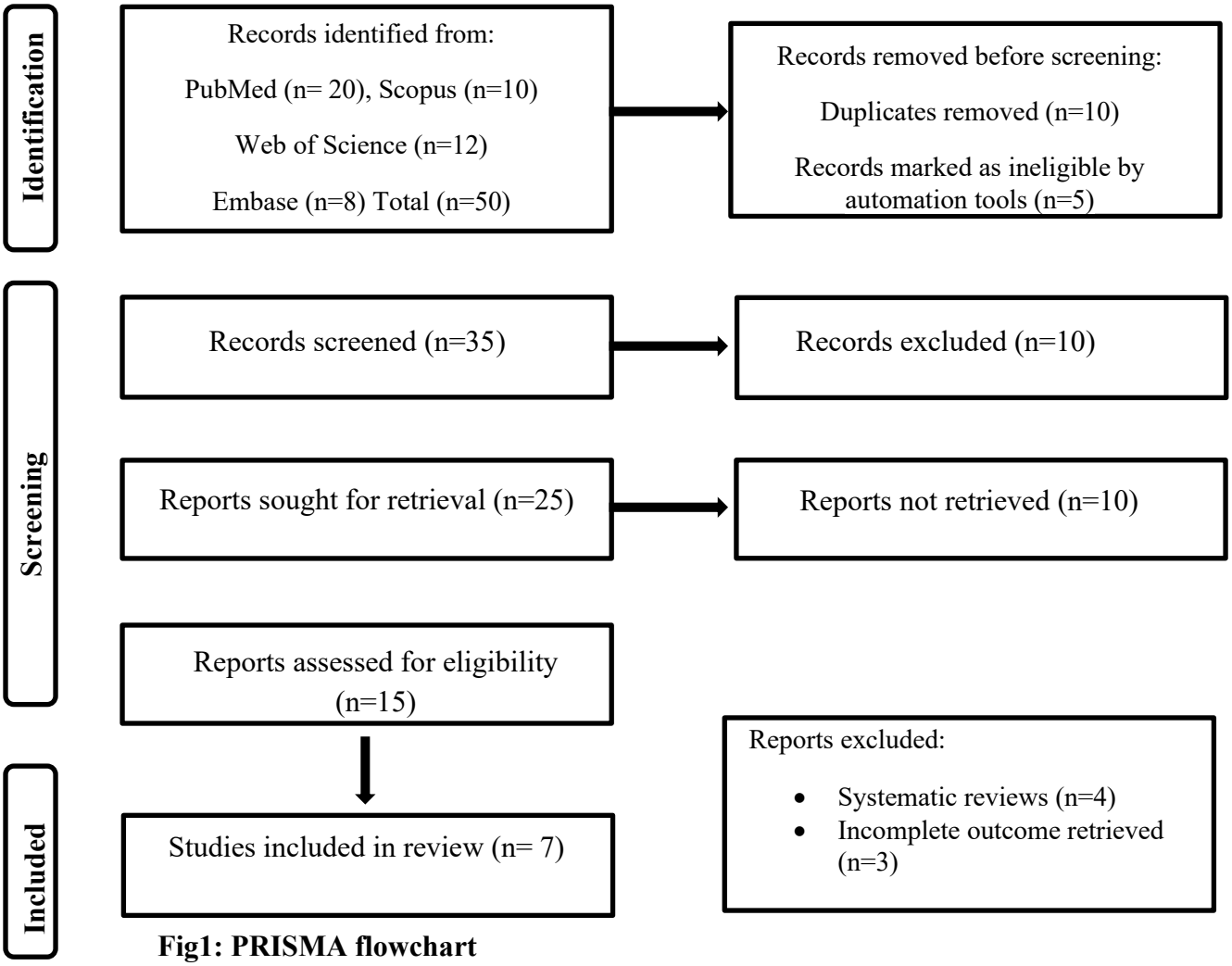

Fig1: PRISMA flowchart

DATA REVIEWING AND ANALYSIS

The reviewed full texts and abstracts of the chosen studies were used to obtain the data on lifestyle intervention and its impacts on menstrual frequency among women with PCOS. Collected data was entered into an Excel spreadsheet, pre-selected by the investigators, with such factors as the study design, sample size, sample characteristics, type and duration of intervention and main reproductive outcomes (menstrual period, ovulation rate, ovulation frequency, regularity of the cycle). Secondary measures were also taken on body mass indices (BMI), insulin resistance, and androgen concentration. The data were refined accordingly and variables that have missing information were dropped. The dataset collected was evaluated in a descriptive manner to determine recurring patterns, differences in intervention efficacy, and general evidence regarding the effectiveness of lifestyle modification to menstrual patterns.

RESULTS

The current review incorporated seven studies [5, 9, 14] (Table 1). The analysis was conducted on four randomized controlled trials [5, 12, 14] and three quasi-experimental/prospective interventional studies [9, 11]. The articles were written in the year between 2019 and 2025. The sample size covered 566 participants, whose age groups were 14 years to 40 years, with most of the participants being teenagers and young adult women with PCOS. The sample sizes ranged between 38 and 128. The duration of follow-up was between 2 months and 12 months with the intervention being either structured diet, aerobic exercise, behavioral modification or a combination of lifestyle programs. Measured outcomes included menstrual cycle regularity, ovulation, BMI, andogen levels, insulin resistance and anthropometric indices. The improvements in menstrual regularity were noted in all studies, as well as weight loss and increasing metabolic and hormonal status. Increased compliance to lifestyle interventions was associated with enhanced reproductive outcomes. Generally, the lifestyle (PLI) was effective as a first-line therapy in the regulation of menstrual and metabolic patterns in PCOS women.

Abd-Elhakam et al (2025) carried out a quasi-experimental research study within the outpatient gynecological and infertility clinics of the Beni-Suef University Hospital and a specialized infertility medical center to determine the impact of lifestyle change on fertility and menstrual regularity of infertile women with polycystic ovary syndrome (PCOS) who are overweight and obese. One hundred and five women were assigned as a purposive sample in the study and control groups. The structured interview questionnaire, lifestyle and habits assessment instruments, the Block Adult Physical Activity Screener, and follow-up records were used to collect the data. Six months of dietary and exercise treatment showed powerful improvements in regularity of menstrual cycle, ovulation, and fertility rates. The authors concluded that lifestyle modification can be the first-line management of obese women with PCOS [9].

A prospective interventional study carried out in the Department of Obstetrics and Gynaecology at GMC Srinagar between August 2018 and January 2020 was used to assess the effects of structured lifestyle changes on the regularity of the menstrual cycle in women with PCOS (Bashir et al, 2025). One hundred and fifty-nine women diagnosed with the Rotterdam criteria, aged 18-35 years, were registered. The participants were part of 12-month program consisting of caloric restriction (1200-1500 kcal/day), balanced macronutrients diets, moderate aerobic exercise (150 minutes/week) as well as behavioral modification. At the end of the study, 68% have normalized menstrual cycles ($p<0.001$). BMI (mean weight loss 4.2 ± 1.6 kg) and HOMA-IR, total testosterone levels and LH/FSH ratio were also significantly improved. These authors concluded that lifestyle modification is a viable first-line intervention to restore menstrual regularity to PCOS patients [10].

A quasi-experimental study by Hassan et al (2025) aimed at the impact of a lifestyle change program on obesity and menstrual regulation of infertile overweight and obese women with polycystic ovary syndrome (PCOS). Eleven six (116) women were recruited on a purposive

sample and were divided into study and control groups. Baseline results revealed that almost all the participants had disordered menstrual cycles before intervention. Menstrual control and cycle characteristics also improved greatly after the introduction of the lifestyle program. The result showed that 60.3% of women in the study group regained regular menstrual cycles in comparison with unremitting irregularity in a significant percentage of the control group. Further, there was a high association between elevated physical exercise and better ovulatory performance. The authors found that structured lifestyle interventions are helpful to improve menstrual regulation and BMI in obese women with PCOS [11].

A cluster randomized controlled trial by Nahidi et al (2024) was undertaken to assess the effects of a lifestyle promotion program on anthropometric indices and clinical manifestation of adolescents with polycystic ovary syndrome (PCOS). The researchers involved 128 girls (age range: 14-18), and the study was conducted in the period between January 2021 and March 2022, and with 12-month follow-up. Both participants with and without PCOS were randomly assigned to an eight-session lifestyle intervention (balanced diet, regular exercise, and behavioral modification) or control group. A significant weight loss (reduction of -3.14 kg) and a waist circumference loss (reduction of -4.68 cm) were found in the PCOS intervention group ($p<0.001$). Regularity of menstruation was also increased significantly (OR 3.30; 95% CI 2.06 present 5.25) as well as there was a decline in the severity of acne. The authors concluded that school-based lifestyle influences are effective in improving the pattern of menstruation and PCOS manifestation among adolescents [5].

Park et al (2021) used a randomized controlled trial to assess the implications of college-based lifestyle modification program (LMP) on menstrual health in young adult women with irregular menses. The researchers recruited 38 females who had less than 10 menstrual cycles per year and randomly selected them as either experimental or control subjects. The College-based LMP consisted of small-group education, personal exercise and diet counseling, and continued feedback and support. The primary outcomes were menstrual cycle index (MCI), sex hormone-binding globulin (SHBG) and androgenic profile (testosterone and free androgen index) whereas the secondary outcomes included premenstrual symptoms, menstrual volume, body composition, glycemic parameters, sleep duration, perceived stress, and nutrient consumption. The primary outcomes showed no significant changes, but the premenstrual depression symptoms and sleep duration had an improvement. The authors also concluded that lifestyle intervention could aid in maintaining healthier menstrual life and should be developed further [12].

Kazemi et al (2020) used a randomized controlled trial to determine the impact of two dietary lifestyle predictors on ovarian morphology, hyperandrogenism, and menstrual irregularity in patients with polycystic ovary syndrome (PCOS). Women aged 18-35 years were randomly assigned to a pulse based diet (lentils, beans, split peas, chickpeas) or Therapeutic Lifestyle Changes (TLC) diet, supplemented with aerobic exercise (45 minutes/day, 5 days/week) and monthly health counseling (16 weeks). Pulse-based intervention and TLC thirty and thirty-one women, respectively, completed the intervention. Both groups had a significant decreasing number of follicles per ovary and ovarian volume, free androgen index and length of menstrual cycle (all $p<0.01$). At six months, there remained further improvement although tended to revert to baseline at 12 months. The authors concluded that lifestyle adjustment enhances ovarian and reproductive response in PCOS, irrespective of a particular type of diet [13].

DISCUSSION

This systematic review suggests that dietary modifications, physical exercises, and behavioral interventions are key issues of lifestyle interventions that can help increase menstrual regularity and overall reproductive health in women with PCOS. Despite the differences in designs, duration and precise methods used in individual studies, there is convergent evidence of

individual study clinical research and more broad-based analysis in support of the physiological rationale behind such interventions.

Several dietary practices, especially those involving low glycemic index (GI) foods, calorie restriction and balanced macronutrient consumption have been linked to an improvement in menstrual cyclicity and hormonal balance of reproductive hormones in PCOS women. Evidence indicates that nutrition programs have the potential to directly modify insulin relationships and to decrease hyperandrogenism which are two major physiological anovulation and irregular cycle promoting factors in PCOS. Indicatively, Low-GI diets were associated with a considerable drop in insulin resistance index and the significantly larger percentage of women saying that their menstrual cycles were normal compared with standard diets. These dieting patterns aid in regulating glycemia and diminishing the metabolic load, which subsequent to the phenomenon, probably contributes to the stability of the hypothalamic-pituitary-ovarian (HPO) response and more anticipated ovulatory function [15].

Another lifestyle management pillar in PCOS is physical activity. The RCT analysis of exercise regimes reveals that weekly aerobic or resistance exercise, at moderate intensity of at least 150 minutes, may enhance reproductive outcomes by improving the sensitivity of insulin, losing weight, and lowering hyperandrogenic profiles. Research revealed that exercise positively affects the frequency of menstrual cycles, ovulation rates in part due to decreases in adiposity, which decreases production of peripheral androgens and corrects metabolic imbalances [4]. Physical training is not always associated with consistent positive effects on all reproductive measures, but, when used in combination with the dietary modifications, exercise seems to reinforce the positive outcomes on the menstrual cycles and metabolic well-being.

The major mechanistic correlation between lifestyle factors and reproductive dysfunction is insulin resistance, a characteristic of PCOS. Dietary and exercise interventions enhance insulin sensitivity that induces downstream effects on androgen levels and follicular development [2]. Enhancement of insulin sensitivity may result in less luteinizing hormone (LH) preeminence and a diminished free androgen index (FAI), and less hyperandrogenism weight on folliculogenesis and ovulation. Although large clinical trials direct evidence in menstrual regularity solely in men is still developing, these improvements in metabolism were closely linked to improved ovulatory activity and more normal menstrual cycles in PCOS cohorts [16].

Structured education and behavioral assistance also seem to have an asset on following lifestyle regims, which is the key to sustainable change. There are indications that cognitive behavioral models and nutrition education modules can be used to assist women in adopting and sustaining healthier eating and physical activity patterns, which will result in a larger weight control and physiological response. These aspects were not directly measured in all the intervention studies; however, qualitative research points out to women with PCOS tend to have difficulty planning to take a lifestyle advice routinely and therefore the role of support mechanisms plays a critical role in guiding effective change [17].

Notably, although weight reduction is often emphasized as a major outcome, it has been proposed that even a relatively small decrease in body weight (510 percent) can lead to a rich gain in metabolic and menstrual phenotypes. This highlights the argument that a lifestyle intervention does not require a radical weight loss to provide reproductive gains, but instead, a more metabolically healthy dietary pattern and physical activity are in them capable of stimulating menstrual regularity.

Regardless of the evidence promise, there are limitations. Most of the studies lack large sufficient samples, limited follow-ups, and unstandardized intervention regimes, which complicate the arrival at conclusive and universally applicable decisions. In addition, studies do not have standard outcome measures of menstrual regularity and ovulation, which makes it difficult to compare studies across studies. Further high-quality randomized controlled studies

that involve standard protocols and longitudinal follow-up are required to demystify the best elements and strength of lifestyle modifications in menstrual health in PCOS.

CONCLUSION

This systematic review demonstrates the proves of lifestyle changes, such as diet, exercise, and behavioral counseling, in enhancing menstrual cycles in women with PCOS. Structured programs have been shown to increase ovulatory performance, decrease hyperandrogenism, increase insulin sensitivity and aid in weight loss. As a non-pharmacologic intervention to treat PCOS-related menstrual irregularities, lifestyle modification must be considered a first-line procedure. Further, high-quality research is required in the future to standardize intervention procedures, determine the most efficient elements, and assess long-term sustainability and reproductive outcomes in different communities.

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APPENDIX

Table 1: Key Recent Studies on the PCOS lifestyle intervention:

Author and Publication Year	Study Design	Population, Sample Size, and Characterization	Main Points	Results and Main Findings
Abd-Elhakam FH, et al. (2025) [9]	Quasi-experimental study	Infertile overweight/obese women with PCOS, n=115	Evaluated effects of lifestyle modifications on fertility and menstrual regularity	Significant improvements in menstrual cycle regularity, ovulation, and fertility outcomes after 6 months; lifestyle modification recommended as first-line management
Bashir N, et al. (2025) [10]	Prospective interventional study	Women 18–35 years with PCOS, n=100	Assessed structured lifestyle intervention (diet, exercise, behavioral modification) on menstrual regularity	68% achieved menstrual cycle normalization; significant improvements in BMI, HOMA-IR, total testosterone, LH/FSH ratio; lifestyle modification

				effective first-line treatment
Hassan H, et al. (2025) [11]	Quasi-experimental study	Infertile overweight/obese women with PCOS, n=116	Evaluated lifestyle modification program on obesity and menstrual regulation	60.3% of study group achieved regular menstrual cycles; increased physical activity associated with improved ovulatory function; BMI and menstrual regularity improved
Nahidi F, et al. (2024) [5]	Cluster randomized controlled trial	Adolescents 14–18 years with PCOS, n=128	Assessed school-based lifestyle promotion program on anthropometry and PCOS manifestations	Weight −3.14 kg, waist −4.68 cm; menstrual regularity improved (OR 3.30); acne severity decreased; lifestyle programs effective in adolescents
Park YJ, et al. (2021) [12]	Randomized controlled trial	Young adult women with irregular menses, n=38	Evaluated college-based lifestyle modification program on menstrual health	Improvements in premenstrual depression/anxiety and sleep duration; no significant changes in MCI, SHBG, or androgen profile; lifestyle intervention supports healthier menstrual function
Kazemi M, et al. (2020) [13]	Randomized controlled trial	Women 18–35 years with PCOS, n=61	Compared pulse-based diet vs TLC diet combined with aerobic exercise on ovarian morphology, hyperandrogenism, and menstrual irregularity	Both diets improved follicle number, ovarian volume, free androgen index, and menstrual cycle length; improvements persisted at 6 months; no diet superior; lifestyle

				modification improves reproductive outcomes
Oberg E, et al. (2019) [14]	Randomized controlled trial	Obese women 18–40 years with PCOS, BMI ≥27 kg/m², n=68	Evaluated behavioral modification intervention on menstrual function	Intervention group had significant weight loss (−2.1%) and improved menstrual regularity (mean difference 35%); at 12 months, 54% had improved cycles, 43% ovulated, 38% achieved pregnancy; behavioral modification effective first-line strategy