Original Study

Effect of Dietary Weight Loss on Menstrual Regularity in Obese Young Adult Women with Polycystic Ovary Syndrome

Tayseer M. Marzouk MD [1], Waleed A. Sayed Ahmed MD, MRCOG [2,*]

[1] Department of Maternity and Gynecology of Nursing, Faculty of Nursing, Mansoura University, Mansoura, Egypt
[2] Department of Obstetrics and Gynecology, Faculty of Medicine, Suez Canal University, Ismailia, Egypt

A B S T R A C T

Study Objective: To investigate the effect of dietary weight loss on menstrual regularity in obese adolescent women with polycystic ovary syndrome (PCOS).
Design and Setting: A randomized controlled trial was held at the Faculty of Nursing, Mansoura University, and the Obesity Clinic of the Rheumatology Department at Mansoura University Hospitals between July 2011 and January 2013.
Participants: Sixty adolescent women with PCOS, body mass index (BMI) greater than 30, and complaints of menstrual irregularities were included in this study. Enrolled women were divided equally and randomly into 2 groups: intervention and control groups.
Interventions: Women in the intervention group (n = 30) were subject to an intensive dietary educational program with instructions to follow a conventional energy restricted diet, whereas women in the control group were instructed to follow the same healthy diet of the first group without calorie restriction.
Main Outcome Measures: Menstrual regularity, weight loss, the effect on waist circumference, and hirsutism score.
Results: The 2 groups were initially matched in average body weight, BMI, hirsutism score, and waist circumference. Six months later, there were significant decreases in all parameters in the weight reduction group. In addition, more menstrual episodes were recorded in the weight reduction compared with the control group (3.1 $\pm$ 1.2 vs. 2.3 $\pm$ 1.3; P = .010). Also, BMI, waist circumference, and hirsutism score were all significantly decreased at the end of the study.
Conclusion: Dietary weight loss in adolescent women with PCOS resulted in significant improvement in menstrual regularity, BMI, waist circumference, and hirsutism score.
Key Words: Weight reduction, PCOS, Healthy diet, Menstrual regularity, Waist circumference, BMI, Hirsutism score

Introduction

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders among reproductive-age women, affecting 5% to 10%.[1] PCOS is a heterogeneous disorder with the features of hyperandrogenism and chronic anovulation. Menstrual irregularity is an upsetting aspect of PCOS that might lead to significant health problems for such patients. One aspect is that infrequent menstrual flow also carries a threefold increased risk of endometrial carcinoma.[2]

Although there are no published guidelines to correct menstrual irregularities in patients with PCOS, several studies suggest that weight loss, even as little as 5% from baseline, can have positive effects on hyperinsulinemia and hyperandrogenemia, and restore normal menstrual function in such patients.[3–7] Kiddy et al[8] reported improvement in menstrual function in 9 of 11 patients (82%) with oligomenorrhea who lost greater than 5% from baseline body weight on a 1000 kcal per day and low fat diet over 6 to 7 months. A recent study demonstrated a significant improvement of menstrual function associated with a significant decrease in insulin resistance for a group of women with PCOS after 12 weeks of consuming either a hypocaloric low fat diet or a very low carbohydrate diet.[9] Overall, weight management might be preferable as first-line treatment in patients with PCOS, because it targets not only menstrual irregularity but also insulin resistance, which is a risk factor for long-term morbidity associated with PCOS.

To the best of our knowledge, there is no Egyptian study on dietary therapy alone to treat menstrual irregularity. We aimed to evaluate our experience in setting up a specific clinic for management of these obese young women with PCOS-related problems and specifically investigate the effect of dietary weight loss on menstrual cycle regularity in this subset of patients.

Materials and Methods

Adolescent women in this randomized controlled trial of parallel design were recruited between July 2011 and January 2013 from 2 settings: (1) female nursing students from the Faculty of Nursing at Mansoura University registered for the academic year 2011 to 2012; and (2) The Obesity Clinic of the Rheumatology Department at Mansoura University Hospitals, from which patients seeking weight reduction with PCOS were referred from gynecology clinics. All candidates were verbally invited to participate in

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* *Address correspondence to:* Dr Waleed Ali Sayed Ahmed, MD, MRCOG, Department of Obstetrics and Gynecology, Faculty of Medicine, Suez Canal University, Round Road, Ismailia 41111, Egypt; Phone: +201091214406 (mobile), +2663334230 (landline); fax: +2 (064)3227426
E-mail address: waleed.asa@gmail.com (W.A. Sayed Ahmed).

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the study. Informed written consent was obtained from each participant after the aim and methods of the study were clarified.

Single adolescent women with a diagnosis of PCOS on the basis of the presence of: menstrual cycle disturbances, in the form of either oligomenorrhea (eg, <6 menstrual cycles during the past year preceding enrollment), or amenorrhea (eg, no menstruation for ≥6 months), features of androgen excess (eg, hirsutism based on the Ferriman–Gallwey score and acne), and/or biochemical hyperandrogenemia and with a body mass index greater than 30 were eligible for the study. Because all of our patients were obese, single, and virgin young women, it was very difficult to rely on transabdominal scanning to evaluate the polycystic nature of the ovaries. Although scanning was carried out for all of the study participants, only in few cases were the ovaries seen clearly to diagnose PCOS and/or the presence of increased ovarian size. Therefore, we relied mainly on menstrual cycle irregularities in addition to features of androgen excess. Women with medical diseases that required medical supervision such as diabetes mellitus, those using medications known to cause menstrual disturbances such as antiepileptic or antipsychotic drugs, or those who did not give their consent were excluded from the study. To confirm a participant's eligibility, subjects attended a screening visit for physical examination and medical, dietary, and menstrual histories were taken, either at the Obesity Outpatient Clinic or at the Student's Clinic at the Faculty of Nursing.

Convenience sampling was used to recruit participants on the basis of the aim of the study and on the predetermined inclusion and exclusion criteria. The sample size of this study was 30 women in each group on the basis of a power of 80% and a 2-sided significance level of 5%. The 60 eligible participants were randomized by means of block randomization (block size of 5) into 2 groups: the weight loss group (group 1) and the control group (group 2). Participants were grouped in the order they were recruited. The first group was assigned to the intervention group, abd the following set of 5 was assigned to the control group and so forth. Grouping the participants into small blocks of 5 would ease the instruction and follow-up processes.

Intervention

Weight Loss Group

An intensive education program was administered for this group with 2 sessions on 1 day for 6 small groups (5 per each group), with a duration of approximately 30 to 60 minutes for each session. During the first session, the definition, symptoms, complications of PCOS, and the importance of weight reduction were discussed with the participants. During the second session, patients were instructed to follow a conventional energy restricted diet (starting from the next day) for 6 months. The caloric intake was individualized and calculated according to the Harris–Benedict equation,[10] which is used to assess the daily caloric needs according to the individual's activity level. Then, daily intake was reduced by 500 calories to assist with weight loss.

Thus, the caloric intake in the intervention group ranged from 1800 to 2300 kcal. From 15% to 20% of energy intake was in the form of protein, 30% was in the form of fat, and approximately 50% to 55% in the form of carbohydrates.[11] The caloric intake was then divided into 3 meals that were individualized to each participant on the basis of their weight. Moreover, participants in this group were instructed to consume carbohydrates with a low glycemic index such as nuts, fruits, and whole grains. Additionally, they were encouraged to consume a healthy diet through increased consumption of fresh vegetables and food high in fiber content, to drink a minimum of 2 liters per day of permitted fluids, and to take a daily multivitamin supplement. Conversely, they were instructed to decrease foods that are high in saturated fats such as meats, cheeses, and fried foods, and caffeine was discouraged as a part of the healthy diet plan. Participants in this group received instruction manuals that included a sample meal plan and recipes, and they were educated on how to implement the dietary regimen. Any weight reduction that was helpful in improvement of menstrual episodes was considered to be a successful weight reduction.

Control Group

Participants in this group were not permitted to participate in the weight loss program during the study period, but they were instructed to follow the same healthy food diet of the first group without restriction in calories, so any improvement in the first group would be due to the caloric restriction, not due to the healthy food, because it was similar in the 2 groups.

Participants in the study groups were educated on accurate recording of dietary intake, which were reviewed initially weekly and then biweekly by the nursing researcher under supervision of the dietitian to monitor the dietary compliance using the 24-hour recall method. This approach is valid as a clinical tool in which participants record their intake in the 24 hours preceding the clinic visit.[12] This allowed the assessment and examination of the participant's adherence to the specified dietary schedule and compliance.

The following outcome measures were evaluated at the start and then at the end of the study (after 6 months): body weight was obtained (to the nearest 0.1 kg) at each visit using the same scale while the participants wore light clothing. Height was measured (to the nearest 0.5 cm) with use of a fixed stadiometer with right angle headpiece, with participants in bare feet. BMI was calculated by using the equation: weight (kg)/height (m^2) and defined according to the World Health Organization guidelines: overweight, 25.0 to 29.9 and obese, greater than 30.[13] Waist circumference (WC) was measured during expiration according to the NHANES III anthropometric manual and recorded in centimeters to the nearest 0.1 cm (http://www.cdc.gov/nchs/data/nhanes/nhanes3/cdrom/nchs/manuals/anthro.pdf). The count of the menstrual cycles was recorded during the study period. Patients were instructed to call the investigators if their periods were delayed more than 3 months and they were worried about that. The participants were advised to take hormonal treatment for withdrawal if their periods were at