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RESEARCH ARTICLE

COMPARATIVE STUDY OF THE EFFECT OF LIFESTYLE MODIFICATIONS IN OBESE PCOS PATIENTS VERSUS LEAN PCOS WOMEN

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ABSTRACT

Aim & Objective: PCOS is the most common endocrine disorder affecting women of fertile years. There are two phenotypes in PCOS, namely obese PCOS and lean PCOS. Lifestyle modification is one of the effective ways of management of PCOS. This study was planned to compare the effects of lifestyle modification in obese and lean PCOS patients. **Materials and Method:** Our study included the data of PCOS patients attending Gynecology OPD services in GMKMCH who followed up over a period of 9 months from August 2021 to April 2022. All the PCOS patients who were initiated on lifestyle modification like low GI diet which is routinely advised were recruited over a period of 3 months and followed up for 6 months. The issues addressed included relief of symptoms – menstrual cycle regularization, improvement in fertility, acne and acanthosis nigricans. PCOS patients were categorized as obese when the BMI was ≥ 25 kg/m² & lean PCOS as BMI between 18.5 to 24.9 kg/m². **Results:** Of the 400 patients who followed-up as well as complied with the diet, 208 were obese PCOS and 77 were lean PCOS patient. 190 (91.3%) had menstrual irregularities out of which 168 (88.4%) had their menstrual cycles regularized with lifestyle modification at the end of 6 months. 71 (34.1%) had acne from whom 2 (2.8%) had their acne relieved. 105 (50.4%) had acanthosis nigricans among which 1 (1.4%) had reduction of the skin lesions. 71 (92.2%) patients of the non-obese patients had menstrual irregularities out of which 16 (22.5%) had their cycles regularized. 40 (56.3%) patients had acne of which 1 (2.5%) had improvement in acne. 19 (26.7%) had acanthosis nigricans. Of them, no improvement was seen in this study. In the married patients with PCOS, 17.6% conceived in obese PCOS whereas 5% conceived in lean PCOS.

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INTRODUCTION

Polycystic ovary syndrome (PCOS) is the most common endocrine condition affecting up to 13% of reproductive-aged women (1). It is diagnosed by the European Society for Human Reproduction and Embryology/American Society for Reproductive Medicine (ESRHE/ASRM) criteria, requiring two of the following features: polycystic ovaries on ultrasound, oligo-ovulatory or anovulatory cycles and biochemical or clinical hyperandrogenism (2). Women with PCOS experience a combination of reproductive (infertility, pregnancy complications) (3), metabolic (risk factors for and conditions of type 2 diabetes (T2DM) and cardiovascular disease (CVD)) (4, 5) and psychological (conditions including anxiety, depression, poor quality of life (QoL), disordered eating) comorbidities (6, 7). PCOS is not exclusive to obese women, it also occurs in lean women.

A study by Satyaraddi *et al*. shows that obese and lean women with PCOS, compared to the control group, are metabolically worse and have more visceral adiposity, concluding that non-obese PCOS presents a metabolic risk similar to that of obese patients because they present a similar amount of visceral adipose tissue (8). Weight and lifestyle (diet, physical activity and behavioral) management are first-line therapy in international evidence-based guidelines for PCOS. Physical activity like vigorous aerobic exercise has been shown to improve body composition, cardiorespiratory fitness and insulin resistance. Eating habits play an essential role in preventing and treating women with PCOS. International recommendations indicate that weight control is one of the main treatment strategies for PCOS since obesity worsens the clinical presentation of this syndrome (9). There is still no consensus on what is the best nutritional treatment for PCOS.

However, according to Faghfoori *et al*., it is recommended to carry out a dietary treatment that has an impact on the control of IR, metabolic functions from a hypocaloric diet, with a low contribution of simple sugars and refined carbohydrates, promoting the intake of foods with a low glycemic index (GI) (10).

MATERIALS AND METHOD

A prospective observational study conducted in the department of Obstetrics and Gynecology, GMKMCH, Salem, Tamil Nadu, India among outpatients attending Gynecology OPD during a period of 9 months observed in the study. Among 400 PCOS patients, history, clinical examination and ultrasound were performed. Based on BMI – patients are categorized into obese and lean PCOS. The inclusion criteria and exclusion criteria are listed in a separate table (Table 1). Lifestyle modification was dietary change and physical activity. As per hospital protocol all PCOS patients were put on dietary change and physical activity based on their BMI and calorie need. Patients who adapted lifestyle changes were further followed up and analyzed for symptom relief including menstrual cycle regularization, fertility, acne and acanthosis nigricans.

Table 1. Inclusion and exclusion criteria for the study

INCLUSION CRITERIA:
1.PCOS patients without any comorbidities who were initiated on lifestyle modification – both obese and lean 2.Age 15 to 40 years 3.Patients on regular follow-up
EXCLUSION CRITERIA:
1.Age <15 years and >40 years 2.Menstrual disorders due to other causes except PCOS 3.PCOS with endocrine disorders or systemic illness

RESULTS

We recruited 400 patients for study out of which 290 (72.5%) were obese PCOS and 110 (29.5%) were lean PCOS patients (Figure 1).

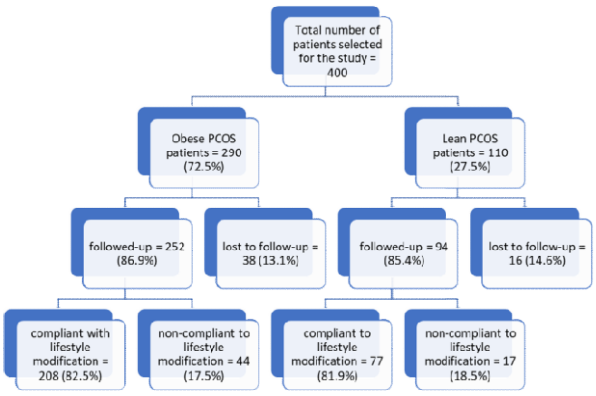

Figure 1.

Obese PCOS Patients: In obese PCOS 38(13.1%) lost for follow up and among the remaining 252 patients, 44 (17.5%) were non-compliant with the lifestyle modification. The 208patients from the 290 obese PCOS patients who were compliant to diet and follow-up falling under the inclusion criteria showcased the following features: 190 (91.3%) had menstrual irregularities out of which 168 (88.4%) had their menstrual cycles regularized with lifestyle modification at the end of 6 months.

71 (34.1%) had acne from whom 2 (2.8%) had their acne relieved. 105(50.4%) had acanthosis nigricans among which 1 (1.4%) had reduction of the skin lesions.

Non-obese or Lean PCOS patients: 110 (27.5%) of the 400 recruited patients are non-obese PCOS patients of which 16 (14.5%) were lost to follow-up. 17 (18%) patients of the followed-up patients were not compliant with the diet. This brings 77lean PCOS patients compliant to both lifestyle modification and follow-up into our study whose characteristics are as follows:

71 (92.2%) patients of the non-obese patients had menstrual irregularities out of which 16 (22.5%) had their cycles regularized. 40 (56.3%) patients had acne of which 1 (2.5%) had improvement in acne. 19 (26.7%) had acanthosis nigricans. Of them, no improvement was seen in this study.

Table 2. Comparison of menstrual cycle regularization between obese and non-obese PCOS patients

Type of PCOS	No of patients with menstrual irregularities at the start of the study	No of patients with regularization of cycles
Obese PCOS	190	168 (88.4%)
Non-obese PCOS	71	16 (22.5%)

Chi Square Test p value = < 0.0001Significant

Table 3. Comparing improvement of acne between obese and non-obese PCOS patients

Type of PCOS	No of patients with acne at the start of the study	No of patients showing improvement of acne
Obese	71	2 (2.8%)
Non-obese	40	1 (2.5%)

Chi Square Test p value = 0.921 Not significant

Table 4. Comparing improvement of acanthosis nigricans between obese and non-obese PCOS patients

Type of PCOS	No of patients with acanthosis nigricans at the start of the study	No of patients showing improvement in acanthosis nigricans
Obese PCOS	105	1 (1.4%)
Non-obese PCOS	19	-

Chi Square Test p value = 0.669 Not significant

Table 5. Conception rate comparison between obese and non-obese PCOS patients

Marital Status	Obese PCOS	Non-obese PCOS
Married	68	20
Pregnancies	12 (17.6%)	1 (5%)

Chi Square Test p value = 0.161 Not significant

DISCUSSION

Obesity is an important aspect of PCOS although a small but significant proportion of PCOS patients have their bodyweight in the range of normal population, termed as lean PCOS or nonobese PCOS (15). Obesity is not a part of the criteria for diagnosis of PCOS as per the Rotterdam criteria (2). According to a cross-sectional study by Satyaraddi *et al*, both obese and nonobese PCOS women when compared to age- and BMI- matched controls were metabolically worse and possess more visceral adiposity (8). Since, visceral fat is a more important driver of insulin resistance, both obese and

lean PCOS possess insulin resistance, pro inflammatory state and endocrinological abnormalities despite varying BMI, bodyweight and abdominal circumference. This can be attributed to the deranged biochemical abnormalities such as increased androgen production and suppression of sex-hormone binding globulin (6). Waist-hip ratio is a better predictor of obesity as compared to BMI and is closely related to obesity related risk factors also (16). WHR > 0.80 indicates obesity which is one of the important features of PCOS. Our objective is to find out the improvement in symptomatology of PCOS patients with lifestyle modification alone and compare between obese and nonobese PCOS patients. According to Faghfoori *et al*, a hypocaloric diet with a low consumption of simple sugars and refined carbohydrates promoting the intake of foods with low GI index and the reduction of saturation of trans fatty acids and addressing the deficiencies of vitamin D, chromium and omega-3 fatty acids have a significant impact on the control of insulin resistance, which is the underlying pathophysiology of PCOS (10). In our study, the diet advised was low glycemic index diet which was followed by 71.72% of obese PCOS patients and 70% of lean PCOS patients. According to a systematic review and meta-analysis done by CH Kim *et al*, 60% in the intervention group showed improved menstrual cycles, while the same was observed in only 3 of the 10 patients (30%) in the control group ($p < 0.05$) (17).In our study, an inspiring 88.4% of the obese patients who complied with the lifestyle modifications and follow-up had their menstrual cycles regularized while in lean PCOS patients, 22.5% had their cycles regularized (Table 2). The symptoms distribution for PCOS according to Shilpi Sharma *et al* is as follows:

Acne	40 (100.0)
Hirsutism	24 (60.0)
Irregular menstruation	35 (87.5)
Premenstrual flare	18 (45.0)
Oligoamenorrhea	37 (92.5)
Obesity	8 (20.0)
PCOS on ultrasound	30 (75.0)

(18) In our study, 34.1% of obese PCOS patients had acne and 2.8% of these patients had improvement in acne symptoms (Table 3). In lean PCOS patients, 56.3% had acne out of which 2.5% had improvement in their acne symptoms (Table 3). 50.4% of obese PCOS patients had acanthosis nigricans out of which 1.4% had symptomatic improvement at the end of six months (Table 4). In lean PCOS patients, 26.7% had acanthosis with no improvement at the end of the study (Table 4). Lifestyle modification plays an important role in the improvement of reproductive outcomes in PCOS patients with obesity. A meta-analysis of the data pertaining to reproductive function after lifestyle modification in obese PCOS patients by CH Kim and Lee found that the group that underwent lifestyle modifications had a significantly higher number of patients with improved menstrual cycles compared to the control group (OR: 4.34, $p = 0.02$). Furthermore, the RCTs reported a significant improvement in menstrual episodes or number of ovarian follicles in the group that underwent lifestyle modifications compared to the control group. Several therapeutic approaches, such as combined oral contraceptives, insulin sensitizers, anti-androgenic drugs, and assisted reproductive therapy, have been used in the management of PCOS patients who wish to conceive a child. However, these treatments might be associated with the risk of adverse effects. The current results regarding the effect of lifestyle modification alone, without any additional treatment, on the reproductive index are expected to offer encouragement for patients regarding their chances of conception due to the fact that PCOS patients often have concerns about fertility(17). In our study, in the married patients with PCOS, 17.6% conceived in obese PCOS whereas 5% conceived in lean PCOS (Table 5). This study emphasizes the role of dietary and lifestyle modification as a cornerstone in the treatment of PCOS in the obese patients. Literature also suggests maintaining the bodyweight in lean PCOS is still a crucial component of treatment (15).

CONCLUSION

In conclusion, lifestyle modification causes a significant improvement in regularization of menstrual cycles and fertility more in obese PCOS patients than in lean PCOS patients. Lean PCOS patients apart from lifestyle modification need medical therapy for similar impact on their PCOS symptoms. This underscores the importance of lifestyle modifications in both obese and lean PCOS patients.

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PCOS and nutritional approaches: Differences between lean and obese phenotype Author links open overlay panelLuigi Barrea [a b], Evelyn Frias-Toral [c], Ludovica Verde [d], Florencia Ceriani [e], Gabriela C ucalón [f], Eloisa Garcia-Velasquez [g], Dino Moretti [h], Silvia Savastano [d], Annamari a Colao [b d], Giovanna Muscogiuri [b d]

Front. Cardiovasc. Med., 15 December 2021 Sec. Lipids in Cardiovascular Diesase Volume 8 – 2021 | https://doi.org/10.3389/fcvm.2021.790454 Prevalence, Pattern and Predictors for Dysliupidemia of Chinese Women WithPolycyctic Ovary Syndrome Xi Luo, Wang-Yu Cai, Xiao-Ke Wu

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