Study about the Effect of choline inositol on PCOS disease in Iraqi women

Tamara Adil AL-Jubouri , Muhammed Ali Khadi, Tabark Jaleel Hamza, Amnh Osamah Mohammed

Faculty of pharmacy /University of Qadisiyah, Republic of Iraq

*Corresponding author: **tamaraadilph95@gmail.com**

ABSRTACT

Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age and is characterized by hormonal imbalances, menstrual irregularities, and metabolic dysfunction. This study aimed to evaluate the effectiveness of Choline Inositol supplementation in improving hormonal and metabolic profiles in Iraqi women diagnosed with PCOS. The research problem focused on the lack of effective, low-risk treatments to manage PCOS symptoms and improve quality of life.An observational, comparative, cross-sectional study design was used. Ninety women aged 18–40 years were divided into three groups: healthy controls, untreated PCOS patients, and PCOS patients treated with Choline Inositol (1000 mg twice daily for three months). FSH, LH, testosterone and prolactin were determined by ELISA and chemiluminescence immunoassays for hormones. BMI and ultrasound were used to evaluate the metabolic and ovarian alterations. The findings indicated a significant increase in BMI, LH, testosterone, and prolactin and a significant decrease in FSH levels in untreated PCOS patients in comparison with healthy ones.

Patients treated with Choline inositol improved in all aspects including reduction of BMI and testosterone levels, normalization of LH/FSH ratio and finally abatement of menstrual irregularity.It is concluded that Choline Inositol has a positive effect on hormonal and metabolic aspects of PCOS. So, tossing in supplements actually looked like it helped with ovulation, toned down those wild androgen levels, and maybe even nudged weight in the right direction for folks with PCOS. Feels like a pretty solid extra tool in the PCOS toolbox,

honestly. Still, gotta say—we seriously need bigger, better studies before anyone starts popping pills left and right or changing up the whole treatment game. Science likes receipts.

Keywords: Pcos, Choline Inositol, Hormonal imbalance

INTRODUCTION

PCOS, or Polycystic Ovary Syndrome, is honestly way more common than most people think. We're talking loads of women in their 20s, 30s, whatever—just trying to live their lives and bam, PCOS shows up. [1] Basically, if you've got two out of these three: weird or missing periods, too much male hormone action (hello, unexpected chin hair), or ovaries that look like a string of pearls on an ultrasound, docs start ringing the PCOS alarm. [2]Stats are all over the place—some say 4%, others push it to 20%. Depends who you ask and which checklist they're using. Either way, it's not rare, and it messes with way more than just your period. We're talking blood sugar drama (insulin resistance, anyone?), risk of diabetes, cholesterol going rogue, heart problems, thickened uterine lining, and—yep—fertility struggles.[3] And it's not just about the body. PCOS can really mess with your head, too. Anxiety, depression, feeling like crap about yourself—those are all on the table. Honestly, the whole thing is a mess, and figuring out how to deal with it is a big deal for a lot of women. [4]From a pathophysiological point of view, we consider PCOS to arise from an interplay of genetic, epigenetic and environmental influences. Hyperandrogenism and insulin resistance are viewed as fundamental features in most cases, resulting in changes in ovarian follicle development and disrupted ovulatory function [5].

At present, PCOS is primarily treated symptomatically with lifestyle changes, hormonal treatments, insulin sensitizer agents such as metformin, and occasionally ovulation induction drugs for fertility [6]. However, for some patients, none of these may be effective or feasible options, all may entail undesirable side effects with potential long-term use.A notable recent treatment possibility is the use of Choline Inositol, a compound that plays a role in cellular signalling, insulin sensitivity, and lipid metabolism. Choline Inositol has shown potential in reducing metabolic and hormonal

abnormalities in women with PCOS [7].

The aim of this study is to assess the impact of Choline Inositol supplementation on hormonal parameters (FSH, LH, testosterone, and prolactin), and BMI, in Iraqi women with PCOS. The aim of the research is to determine whether Choline Inositol may be a beneficial treatment option to be used in adjunct in terms of improving the overall clinical profile of women with PCOS [7].This study will also provide support and evidence to support alternative and supportive therapies that are both accessible and acceptable, especially in areas where traditional therapies may not be possible or desired.

MATERIALS AND METHODES

Study Design and Setting

This study was conducted in the Al-Qadisiyah Teaching Hospital in Iraq and was planned as an observational, cross-sectional, comparative study. The goal was to find out how supplementing with choline Inositol affected the hormonal and metabolic markers of women with PCOS.

Study Population

A total of 90 women aged between 18 and 40 years participated in the study. The participants were divided into three equal groups (n = 30 for each group):

• Group H (Healthy Control Group): Women without clinical or biochemical signs of PCOS.

• Group O (Untreated PCOS Group): Women diagnosed with PCOS based on the Rotterdam 2004 criteria, without receiving any treatment.

• Group C (Treated PCOS Group): Women diagnosed with PCOS who received Choline Inositol 1000 mg orally, twice daily for a period of 3 months.

Inclusion Criteria

Participants were included in the PCOS groups if they met the following criteria:

• Fulfilled at least two of the Rotterdam diagnostic criteria: oligo/anovulation, clinical or biochemical hyperandrogenism, or polycystic ovarian morphology.

• Aged between 18 and 40 years.

• Not on any hormonal, insulin-sensitizing, or fertility medications within the previous 3 months.

• For the treated group: adherence to Choline Inositol for 90 consecutive days.

Exclusion Criteria

Participants were excluded if they had any of the following:

• Pregnancy or lactation.

• History of diabetes mellitus, thyroid dysfunction, liver or kidney disease, or psychiatric illness.

• Use of nephrotoxic drugs or hormonal therapy within the past three months.

• Diagnosed hyperprolactinemia or other endocrine abnormalities.

Data Collection

Demographic data (age, weight, height) were collected from all participants. Body Mass Index (BMI) was calculated using the formula: weight (kg) / height (m^2). Blood samples were obtained from fasting participants (12–14 hours fasting) via venipuncture, using standard aseptic techniques. Approximately 5 mL of blood was collected and centrifuged for serum analysis.

Hormonal Assays

The following hormone levels were measured:

• FSH (Follicle-Stimulating Hormone)

• LH (Luteinizing Hormone)

• Testosterone

• Prolactin

Hormonal assessments were performed using two methods:

• FSH, LH, and Testosterone were analyzed using an automated chemiluminescence immunoassay (CLIA) (Mindray, China).

• Prolactin was measured using the Enzyme-Linked Immunosorbent Assay (ELISA) technique.

Ultrasonographic Evaluation

Ovarian morphology was assessed using ultrasound on day 13 of the menstrual cycle.

• Abdominal ultrasound was used for unmarried women.

• Transvaginal ultrasound was used for married women.

Ultrasound was performed by a certified radiologist using the Vinno G65 ultrasound machine. Ovarian volume, follicle number, and presence of

polycystic features were recorded.

Statistical Analysis

The data collected were analyzed using appropriate statistical software. Mean ± standard deviation (SD) was calculated for continuous variables. Comparison between groups was made using ANOVA and post-hoc tests. A p-value < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

The study revealed distinct differences among the three groups in terms of body mass index (BMI) and hormonal profiles. Untreated PCOS patients exhibited significantly elevated BMI, luteinizing hormone (LH), testosterone, and prolactin levels, alongside reduced follicle-stimulating hormone (FSH) levels. These abnormalities are consistent with the typical hormonal imbalances seen in PCOS.

Participants in the treated PCOS group who received Choline Inositol for 3 months demonstrated notable improvement. Their BMI was reduced, testosterone levels were lowered, and the LH/FSH ratio approached values observed in healthy controls. This indicates that Choline Inositol helps restore hormonal and metabolic equilibrium. This finding would support Choline Inositol's role as an adjunct therapy for individuals with PCOS.

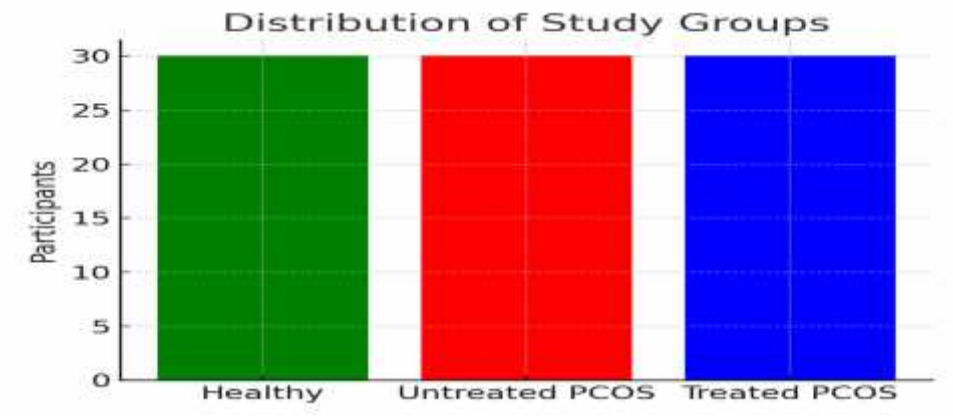

Figure 1. Distribution of participants across the study groups.

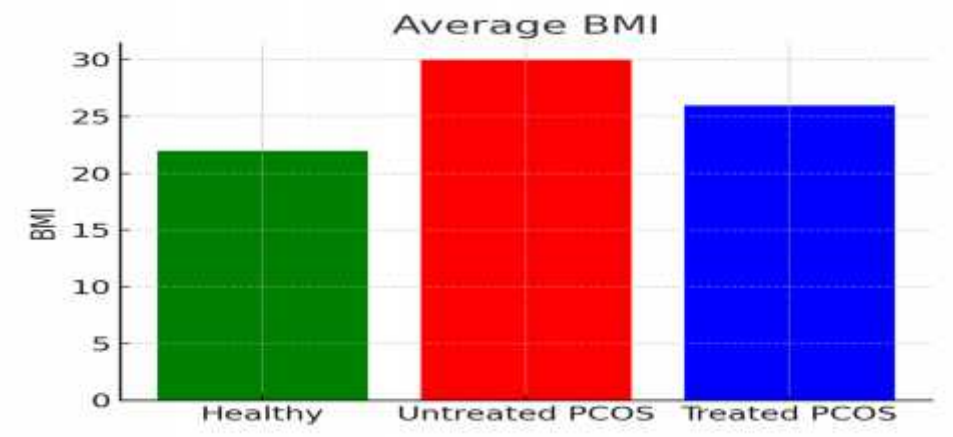

Figure 2. Average BMI in each study group.

Table 1. Hormonal Parameters in Study Groups

Group	FSH (IU/L)	LH (IU/L)	Testosterone (ng/dL)	Prolactin (ng/mL)
Healthy	6.5	5.8	35	12
Untreated PCOS	4.2	11.5	65	22
Treated PCOS	6.1	7.0	42	15

In addition, the reduction in BMI and establishment of normal hormonal parameters in the treated group supports previous work that found that choline inositol improves insulin sensitivity and ovarian function in PCOS women. Notably, the lower testosterone and prolactin levels were highly informative in relation to the clinical features of hyperandrogenism and irregular menstruation/menorrhagia [8].

The results of this study are congruent with clinical trials showing that inositol-based compounds induce ovulatory cycles, decrease levels of androgen, and improve metabolic outcomes among women with PCOS [9]. There was also an improvement in the LH/FSH ratio, an important diagnostic and management diagnostic for PCOS. The improvements highlighted earlier reflect a productive endocrine adaptive response of the supplementation.

Choline Inositol is also a cost-effective, safe, well-tolerated compound and

could be positioned as a non-pharmacological adjunct or alternative to insulin-sensitizing medicines such as metformin for individuals who side-effect or intolerance to standard pharmacological management [10].

CONCLUSION

This study showed that choline inositol supplementation exerts a meaningful positive effect on the hormone and metabolic profile of women with polycystic ovarian syndrome (PCOS). Choline inositol treatment significantly decreased the body mass index (BMI) in addition to serum testosterone and prolactin, and improved LH/FSH ratio when compared to untreated patients. These outcomes indicate that choline inositol is an important component in restoring the Endocrine dysregulation observed with PCOS, and may positively affect ovulatory and menstrual regularity. Choline Inositol represent a potential effective, safe, and inexpensive adjunct therapy for women managing with PCOS.

RECOMMENDATIONS

1. The use of choline inositol as treatment for Polycystic Ovary Syndrome (PCOS), especially for PCOS patients who are intolerant to or resistant to first-line therapies including metformin.
2. As part of management protocols, Hormonal and Metabolic screening for women with PCOS to allow for accurate treatment plans and measures of improvement.
3. Public health campaigns to discuss the therapeutic effects of non-drug methods, for example inositol, for patients with PCOS
4. Future studies via randomized control trials to determine the long-term safety, optimal dose, and relative efficacy of choline inositol to other insulin sensitizing agents.
5. Multidisciplinary care will help bridge the gaps in care provided by gynecologists, endocrinologist, dietitians, and mental health services related to the comorbidities found in PCOS.

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