

## Effects of Date Palm Pollen on Women with the Polycystic Ovarian Syndrome

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### ABSTRACT

**Background:** Polycystic Ovarian Syndrome (PCOS) is characterized by metabolic, endocrine, and genetic abnormalities, as well as the absence of ovulation and clinical and biochemical manifestations of hyperandrogenism. Menstrual irregularities, hirsutism, acne, alopecia, and infertility are all symptoms of PCOS. PCOS is a gynecological condition that affects women of reproductive age. Drugs like clomiphene citrate, tamoxifen, and metformin are used to treat PCOS in women. Alternative medications with fewer side effects and more relative treatment, such as plant-based drugs, especially estrogen-containing drugs, should be sought. The objective of the present study was to evaluate the effectiveness of date palm pollen in PCOS.

**Patients and methods:** One-arm clinical trial was conducted at Alzahraa University Hospital over 2 years from 2018 to 2020; 50 women who met the Rotterdam criteria for PCOS were enrolled in the study, which included daily administration of 3 gm of date palm pollen (DPP) for three months, and followed up for sex hormones, follicle-stimulating hormone (FSH) luteinizing hormone (LH), estrogen, and progesterone after three months of treatment and growth of the follicles every month.

**Result:** There was an improvement in sex hormone levels, with lower estrogen and LH levels and higher progesterone and FSH levels, and a cumulative effect on ovulation. Only 6% of the participated women became pregnant during the study period.

**Conclusion:** Date palm pollen can be used for the management of women with infertility with PCOS.

**Keywords:** Palm Pollen, Polycystic Ovaries, PCOS, FSH, LH.

### INTRODUCTION

Polycystic Ovarian Syndrome (PCOS) is a gynecological condition that affects women of reproductive age. The prevalence ranges between 4 and 12% [1]. In roughly 75% of instances, chronic anovulation is the cause of infertility [2].

PCOS is characterized by metabolic, endocrine, and genetic abnormalities and the absence of ovulation and hyperandrogenism in clinical and biochemical manifestations [3]. Menstrual irregularities, hirsutism, acne, alopecia, and infertility are all symptoms of PCOS. Endocrine hormone alterations include increased estrogen, androgen, decreased progesterone levels, and metabolic problems such as insulin resistance, type 2 diabetes, and dyslipidemia. However, estradiol levels do not change in some cases [4]. Androgen hormone levels rise because ovarian cells are far more active in converting androgenic precursors into testosterone in women with PCOS than in healthy women. This is due to the response of theca cells to luteinizing hormone (LH) [5]. High levels of androgens and testosterone in women with PCOS contribute to ovulation dysfunction and altered sex hormone production, resulting in symptoms and ovary dysfunction in patients, the leading cause of infertility in reproductive-age women [6].

Nowadays, drugs like clomiphene citrate, tamoxifen, and metformin are used to treat PCOS in women despite their severe side effects and relatively poor therapeutic efficacy. Consequently, discovering alternative therapeutics with fewer side effects and having the capacity to provide better efficacy in treating

and managing PCOS, such as plant-based drugs, especially estrogen-containing ones, is a must [7].

The date palm (*Phoenix dactylifera*) has high antioxidant content in its fruit. Southwest Asia and northern Africa are home to this fruit [8]. The date palm fruit contains 44–88% carbs, 2.3–5.6% proteins, and 0.2–0.5% fat. The presence of more than 23 different amino acids in the protein of date palm fruit contributes to its high quality. In addition, the date palm fruit contains 0.5% to 3.9% pectin and 6.4 to 11.5% fiber. The date palm fruit has antibacterial, anti-inflammatory, and antioxidant properties [9].

The date palm fruit contains around 80,400 mg of antioxidant chemicals per 100 g and 3942 mg of carotenoids and phenolic compounds per 100 g [10]. Polyphenols at a concentration of 30,000 ppm (3 g/100 g) were also found in the date palm fruit's components [11].

Furthermore, phytoestrogens, which have a molecular structure comparable to estradiol, are one of the components of date palm. Due to the features mentioned above, the fruit of the date palm is a good source of antioxidants [12]. Male date palm blooms generate pollen, which is a powder. Fresh pollen is made up of 64% to 95% solids and 5% to 36% water. Date palm pollen contains many carbohydrates, minerals, trace elements, lipids, nucleic acids, organic acids, free amino acids, proteins, and over 100 enzymes and cofactors [13]. Date palm pollen is high in carotenoids and flavonoids, and phytochemicals and is a potent source of vitamins A, B, C, D, and E, as well as minerals and hormones [14].

Date palm pollen is composed of steroidal compounds such as estradiol, estrone, estriol, and triterpenes. These compounds are structural precursors such as  $\alpha$ -amyrin and immature gonadotropic structures [15]. DPP extracts also included a non-crystalline estrogenic component. [16].

The presence of estradiol, estriol, and estrone was discovered using liquid chromatography and high-performance analysis of the hexane fraction from Egyptian DPPs [15]. DPPs, according to El-Ridi, produce gonadotrophic hormones such as LH and follicle-FSH [17]. Phytoestrogen is a component of date palm pollen that functions as a weak estrogen antagonist. And also has a potent effect at low estrogen levels, as in cases of PCOS. Also, date palm pollen contains gonadotrophic hormones such as FSH, which help elevate the level of this hormone and enhance ovulation [15].

**The objective of the present study was to evaluate the effectiveness of date palm pollen in PCOS.**

## MATERIALS AND METHODS

### Study design:

One-arm clinical trial included women already diagnosed with PCOS according to (Rotterdam criteria ESHRE/ASRM sponsored PCOS consensus workshop group 2004) [18].

### Inclusion Criteria:

We included women who were diagnosed with PCOS based on the presence of at least two of the following criteria: Oligo and/or Anovulation, Polycystic Ovaries on US Examination, and Hyperandrogenism: clinical (hirsutism, acne and alopecia), and Biochemical (increased total testosterone, free testosterone) [18].

### Exclusion criteria:

We excluded other causes of infertility like male factor and tubal factor.

All the subjects were submitted to full history taking (medical, surgical, obstetrical, menstrual, and gynecologic), in addition to a complete general and gynecological examination.

### Biochemical assay including:

Ovarian function was evaluated by measuring FSH, LH, and estrogen levels at the early follicular phase (day 2 or 3), also measuring mid-luteal progesterone.

Transvaginal U/S: The essential feature for diagnosis of PCOS is the presence of 12 or more follicles measuring 2-9mm in diameter in any one ovary or increased ovarian volume  $>10\text{cm}^3$ . The cases of the study are 50 women with PCOs who were prescribed Date palm pollen 3gm per day for three months.

Three months later, the effectiveness of date palm pollen was assessed by repeated measurement of FSH, LH, and estrogen levels at the early follicular phase (day 2 or 3) and by measuring mid-luteal progesterone levels. Every month, transvaginal ultrasonography was

used to assess the effects of DPP on ovarian follicles by measuring the size of the growing follicle by folliculometry (on days 9, 11, 13), and the largest size of Graafian follicle was recorded every month.

### Ethical consent:

An approval of the study was obtained from Al-Azhar University Academic and Ethical Committee, approved this study (Study ID: 849). Every patient signed an informed written consent for acceptance of participation in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

### Statistical analysis:

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Data were tested for normal distribution using the Shapiro Walk test. Qualitative data were represented as frequencies and relative percentages. Chi-square test ( $\chi^2$ ) to calculate difference between two or more groups of qualitative variables. Quantitative data were expressed as mean  $\pm$  SD (Standard deviation). Independent samples t-test was used to compare between two independent groups of normally distributed variables (parametric data). P-value  $<0.05$  was considered significant.

## RESULTS

The mean age of the studied patients was 20.90 (SD 2.22) and ranged between 18 and 25 years old. Of the participated women the parity zero times 94% and one time 6%, and the abortion zero times 80%, one time 14% and two times 6%.

Table 1 compares the effect of administration of DPP on the hormonal profile, which shows significantly decreased levels of estrogen and LH with a p-value of 0.001 and significantly increased levels of progesterone and FSH with a p-value of 0.001.

**Table (1):** Hormonal profiles of the included patients Pre and post-treatment with DPP.

Variable	Before treatment		After treatment		Parried t-test	
	Mean	SD	Mean	SD	t	P-value
FSH (mIU/ml)	4.69	0.44	5.35	1.21	4.658	0.001
LH (mIU/ml)	9.13	2.28	4.52	0.51	12.631	0.001
E (pg/ml)	59.02	12.38	29.10	5.07	19.057	0.001
P (ng/ml)	6.26	1.83	12.73	1.80	20.008	0.001

Table 2 shows the size of growing follicles over three months of daily administration of 3gm of date palm

pollen which shows a gradual increase and improvement of the size of Graafian follicles with a p-value of 0.001. (Follicle1 means the size of Graafian follicle after one month of treatment, follicle 2 indicates the size of Graafian follicle after 2nd month of treatment, and follicle 3 implies the size of Graafian follicle after 3rd month of treatment).

**Table 2. Follicles size of the included patients after 1, 2, and 3 months of DPP treatment.**

Variable	Minimum	Maximum	Mean	SD
Follicle1 (mm)	8	11	9.24	0.89
Follicle2 (mm)	10	20	15.20	2.29
Follicle3 (mm)	13	23	19.21	2.32
<b>Parried t-test</b>				
<b>Follicle1 VS Follicle 2</b>		<b>P-value 0.001</b>		
<b>Follicle1 VS Follicle 3</b>		<b>P-value 0.001</b>		

Table 3 shows that three patients from the studied group became pregnant and the others showed improvement in growing follicles .

**Table 3: Efficacy of DPP treatment in enhancing pregnancy and improving follicles growth.**

Variable	No	%
<b>Pregnant</b>	<b>3</b>	<b>6%</b>
<b>Improvement in ovulation</b>	<b>47</b>	<b>94%</b>

## DISCUSSION

In women with PCOS, a disturbance in the metabolism and the rate of secretion of androgens and estrogen frequently occurs, and the levels of androgens increase. The frequency of GnRH pulses may be enhanced due to insulin resistance and an excessive increase in insulin. Insulin resistance produces an increase in LH/FSH ratio, and alterations in hormones at the cell surface and granulosa promote an increase in androgen production and a decrease in estradiol synthesis. Finally, follicular maturation is halted, causing ovulation to be disrupted [19].

In recent years, medicinal plants have received attention as they contain active compounds and have no significant side effects, such as palm pollen, which has phytoestrogen and contains gonadotropin, which helps manage PCOS [20].

Oxidative stress is a pathogenic feature of PCOS. Total antioxidant levels decrease in PCOS women, suggesting that in PCOS, reactive oxygen species (ROS) levels rise in ovarian tissue, leading to an imbalance between the oxidant and antioxidant systems. Zinc and selenium are essential antioxidant

compounds present in palm pollen, thus regulating the antioxidant balance in women with PCOS [21]. Palm pollen's antioxidant properties aid in the therapy of PCOS by increasing sex hormone levels and decreasing oxidative stress; hence it aids in the treatment of this syndrome.

According to Rotterdam criteria, our prospective cohort study included 50 women with PCOs, ESHRE/ASRM sponsored PCOs consensus workshop group in 2004 [18].

The cases of the study are 50 women with PCOs who were prescribed Date Palm was pollen 3gm per day for three months. Three months later, the effectiveness of date palm pollen is estimated by repeated measurement of FSH, LH, and estrogen levels at (day 2or 3) of the cycle and mid-luteal progesterone.

The effects of DPP on ovarian follicles are determined through transvaginal ultrasound every month by measuring the size of Graafian follicles on days 9, 11, and 13 and recording the largest size of the follicles.

Our results show a significant decrease in LH levels and estrogen, and also a significant increase in FSH and progesterone levels also had an effect on the size of the follicles, as administration of 3 gm of date palm pollen daily for three months had a cumulative impact on growing the Graafian follicles.

Hosseini *et al.* 2014 [22] found that a dose of 400 mg/kg of palm pollen boosted sex hormone levels and increased the number of antral follicles in rats, which is similar to our findings [22]. In addition, daily usage of date palm pollen for 60 days resulted in decreased estrogen and LH levels, increased progesterone and FSH levels, and an increased number of antral follicles and Graafian follicles, comparable to our findings [23].

Also, our study had a secondary outcome in the form of three out of 50 women with PCOs getting pregnant after the administration of palm pollen. There have been few clinical types of research on the influence of date palm pollen on female fertility. A confirmation of the potential therapeutic efficacy of DPP in managing and treating PCOs requires further clinical investigation.

## CONCLUSION

In conclusion, date palm pollen can be used for the management of women with infertility induced by PCOS. Further studies are needed to confirm the action of palm pollen on ovulation.

**Conflict of interest:** The authors declare no conflict of interest.

**Sources of funding:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Author contribution:** Authors contributed equally in the study.

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