

Analysis of the Effect of Letrozole Tablets Combined with Menotrophin in the Treatment of Infertility of Polycystic Ovary Syndrome

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Abstract: *Objective:* To investigate the clinical effects of Letrozole tablets combined with Menotrophin in infertile patients with polycystic ovary syndrome (PCOS). *Methods:* The time period of the study was from February 2023 to February 2024; 62 cases of PCOS infertility patients admitted to our hospital were selected and divided into an observation group ($n = 31$) and a control group ($n = 31$) by using the method of a random drawing of medical record number. The patients in the control group were treated with Letrozole tablets, and the patients in the observation group were treated with Letrozole tablets combined with Menotrophin, and the sex hormone levels, ovulation rate, the number of mature follicles, endometrial thickness, pregnancy rate, and early miscarriage rate were compared between the two groups. *Results:* Before treatment, the sex hormone levels of the two groups were compared, and there was no statistical difference ($P > 0.05$). After treatment, the sex hormone levels of the observation group were all better than those of the control group, and the differences were statistically significant ($P < 0.05$). The ovulation rate of the observation group was higher than that of the control group, the number of mature follicles was more than that of the control group, and the endometrial thickness was greater than that of the control group, with statistically significant differences ($P < 0.05$). The pregnancy rate of the observation group was higher than that of the control group, and the rate of preterm delivery was lower than that of the control group, and the difference was statistically significant ($P < 0.05$). *Conclusion:* The combined application of Letrozole tablets and Menotrophin can improve the sex hormone level of PCOS infertility patients, promote their ovulation, improve follicular development, restore the thickness of endometrial lining, and increase the pregnancy rate of the patients and reduce the rate of preterm delivery, which is of value for promotion and application.

Keywords: Letrozole tablets; Menotrophin; Polycystic ovary syndrome; Infertility

Online publication: July 22, 2024

1. Introduction

PCOS has a high incidence of gynaecological diseases in women of childbearing age, which can be seen in patients with polycystic changes in the ovaries, high androgen levels, and prolonged ovulation disorders, with the main clinical symptoms of menstrual disorders, acne, hirsutism, oily skin, and insulin resistance-related

symptoms such as obesity ^[1]. Affected by sparse ovulation or anovulation, some PCOS patients are combined with infertility, and the incidence of miscarriage after pregnancy is high. The key to clinical treatment of PCOS infertility is to regulate endocrine and promote ovulation. Letrozole tablets are aromatase inhibitors, which can regulate estrogen levels and promote follicular development ^[2]. However, the use of Letrozole tablets alone to promote ovulation has a limited effect, so it is necessary to combine with other therapeutic drugs. Relevant studies have concluded that the use of Letrozole tablets + Menotrophin in the process of PCOS infertility comprehensive therapeutic intervention can achieve a more satisfactory therapeutic efficacy, and the role of Menotrophin in promoting follicular development and ovulation is more obvious ^[3]. For this reason, this study selected 62 cases of PCOS infertility patients who met the relevant diagnostic criteria and summarised the clinical effects of the combination of Letrozole tablets and Menotrophin.

2. Information and methods

2.1. General information

The time period of the study was from February 2023 to February 2024; 62 cases of PCOS infertility patients admitted to our hospital were selected and divided into an observation group ($n = 31$) and a control group ($n = 31$) by using the method of a random draw of medical record number. The observation group's high and low age range values were 24–38 years old, with a mean of 31.07 ± 2.83 years old, and the high and low infertility duration values were 1–3 years, with a mean of 2.04 ± 0.52 years. In the control group, the high and low age range values were 26–37 years old, with a mean of 31.15 ± 2.79 years old and the high and low infertility course values were 1–2 years, with a mean of 1.94 ± 0.48 years, and the general data of the patients in the two groups were comparable ($P > 0.05$).

Inclusion criteria: (1) Diagnosis of PCOS infertility by imaging and laboratory examination; (2) Compliance with clinical indications for medication; (3) Signing the informed consent for the study.

Exclusion criteria: (1) Taking hormonal drugs for symptomatic treatment in the last 3 months; (2) History of ovarian surgery, uterine fibroids, pelvic adhesions, endometriosis; (3) Combination of psychiatric diseases.

2.2. Methods

The basic treatment of the two groups was the same: Colour Doppler ultrasonography was performed on the 11th–12th day of the menstrual cycle to observe the growth of the endometrium and the diameter of the ovary, if the diameter of the follicle was not less than 18 mm, then intramuscular injection of serum human chorionic gonadotropin (HCG) 250 μg was given, and the patients were told to cohabit for 24–36 hours after the medication was administered. Colour Doppler ultrasonography was performed again 48 hours after the injection of HCG to observe whether the follicle ruptured or not. The colour Doppler ultrasound was performed again 48 hours after HCG injection to observe whether the follicle ruptured. If the follicle ruptured, the patients were instructed to take oral dextroprogesterone once a day, with a single dose of 10 mg, and stop taking the drug for 14 consecutive days. The HCG level was measured and colour Doppler ultrasonography was carried out to confirm whether the patients were pregnant or not, and if the patients did not become pregnant, then they would go on to the next cycle of treatment.

Patients in the control group were treated with Letrozole tablets, which were administered orally twice daily from the 3rd day of the menstrual cycle with a single dose of 2.5 mg and discontinued after 5 days of treatment for a total of 3 menstrual cycles.

Patients in the observation group were treated with Letrozole tablets combined with Menotrophin, and the dosing regimen of Letrozole tablets was the same as that of the control group. Menotrophin was injected

intramuscularly from 3 to 5 days after the onset of menstruation. The first dose of 75 U was injected once a day, and then additional doses were added according to the change of symptoms. The maximum daily dose of 150 U was injected continuously for 5 days, and then the drug was discontinued, and the treatment was carried out for a total of 3 menstrual cycles. At the same time, patients were told to have intercourse within 48 hours of the injection.

2.3. Evaluation criteria

- (1) Sex hormone levels: Fasting lower venous blood was collected before treatment and at the end of the treatment course, centrifuged and processed, and then an enzyme-linked immunosorbent assay was used to measure follicle-stimulating hormone (FSH), luteinizing hormone (LH), estradiol (E2) and testosterone (T).
- (2) Ovulation rate, number of mature follicles, and endometrial thickness: Ovulation rate = effective ovulation cycles/total treatment cycles. The number of mature follicles (follicles are considered mature when they develop to 18–22 mm) and endometrial thickness were detected by ultrasound on the day of HCG injection.
- (3) Pregnancy rate and preterm birth rate: Follow-up for 12 months, count the pregnancy rate and preterm birth rate.

2.4. Statistical methods

SPSS 23.0 software to analyze the research data, measurement data of mean \pm standard deviation (SD) for *t*-test, count data % for χ^2 test, $P < 0.05$ for the existence of differences at the statistical level.

3. Results

3.1. Comparison of sex hormone levels

Before treatment, there was no statistical difference between the sex hormone levels of the two groups ($P > 0.05$). After treatment, the FSH, LH and E2 levels of the observation group were higher than those of the control group, and the T level was lower than that of the control group, and the difference was statistically significant ($P < 0.05$), refer to **Table 1**.

Table 1 Comparison of sex hormone levels between the two groups (mean \pm SD)

Group	FSH (IU/L)		LH (IU/L)		E2 (pmol/L)		T (μ mol/L)	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation group ($n = 31$)	5.08 \pm 0.77	8.61 \pm 1.13	5.24 \pm 0.88	12.38 \pm 2.55	133.28 \pm 15.81	179.86 \pm 16.24	2.91 \pm 0.57	1.38 \pm 0.22
Control group ($n = 31$)	5.12 \pm 0.75	6.72 \pm 0.68	5.19 \pm 0.92	9.24 \pm 1.68	133.35 \pm 15.72	160.24 \pm 10.38	2.86 \pm 0.55	1.94 \pm 0.58
<i>t</i> -value	0.207	7.979	0.219	5.725	0.017	5.668	0.351	5.026
<i>p</i> -value	0.837	0.000	0.828	0.000	0.986	0.000	0.726	0.000

3.2. Comparison of ovulation rate, number of mature follicles and endometrial thickness

After treatment, the ovulation rate, number of mature follicles and endometrial thickness of the observation group were higher than those of the control group, and the difference was statistically significant ($P < 0.05$), refer to **Table 2**.

Table 2 Comparison of ovulation rate, number of mature follicles and endometrial thickness between the two groups [(n/%), mean ± SD]

Group	Ovulation rate	Number of mature follicles (pcs)	Endometrial thickness (mm)
Observation group (n = 31)	23 (74.2)	3.05 ± 0.76	11.38 ± 2.26
Control group (n = 31)	15 (48.4)	1.89 ± 0.32	9.07 ± 1.15
χ^2/t -value	4.350	7.832	5.072
p-value	0.036	0.000	0.000

3.3. Comparison of pregnancy rate and preterm birth rate

The pregnancy rate of the observation group was higher than that of the control group, and the preterm birth rate was lower than that of the control group, and the difference was statistically significant ($P < 0.05$), refer to **Table 3**.

Table 3 Comparison of pregnancy rate and preterm delivery rate between the two groups (n/%)

Group	Pregnancy rate	Preterm birth rate
Observation group (n = 31)	16 (51.6)	0 (0.0)
Control group (n = 31)	8 (25.8)	4 (12.9)
χ^2 -value	4.350	4.275
p-value	0.036	0.038

4. Discussion

According to the relevant survey data, the prevalence of PCOS is about 6–10% in the female population of reproductive age, and the patients mostly develop in puberty, with the main pathological features of ovarian polycystic, abnormally elevated androgen levels, and anovulation, etc. [4] PCOS can affect the process of follicular development and ovulation, which may lead to infertility. The infertility of PCOS needs to be treated by medication to improve the state of sex hormone secretion, and to increase the rate of pregnancy.

Letrozole tablets can selectively inhibit the aromatase enzyme, which can block the conversion of androgens into estrogen, making estrogen unable to exert the negative feedback regulation of the hypothalamic-pituitary-gonadal axis, and can increase the overall level of gonadotropins, accelerating follicular development and maturation. Menotrophin belongs to the gonadotropic hormones, which can promote follicular growth and development and accelerate follicular maturation while increasing estrogen secretion. Menotrophin, which consists of 75 units of FSH and 75 units of LH, has a pharmacological effect of promoting follicular development, and it is a commonly used therapeutic agent in patients with infertility due to PCOS.

The results of this study showed that after treatment, the FSH, LH and E2 levels of the observation group were higher than those of the control group, and the T level was lower than that of the control group, with a statistically significant difference ($P < 0.05$). It is suggested that the treatment of PCOS infertility patients with Letrozole tablets combined with Menotrophin can effectively regulate the level of sex hormones. It is known that FSH and LH are sex hormones secreted by the anterior pituitary gland, and their main role is to promote follicular development and maturation as well as ovulation [5]. E2 is a sex hormone secreted by the follicle in the ovary and its main role is to increase the thickness of the endometrium, which creates a favourable condition for conception. T is formed by the conversion of androstenedione, and it can antagonistically affect

the stimulatory properties ^[6]. PCOS patients are mostly combined with hyperandrogenemia, and the FSH, LH, LH, and Menotrophin can effectively regulate the level of sex hormones. In PCOS patients, the levels of FSH, LH and E2 are low, and the level of T is high, which prevents the formation of dominant follicles and leads to anovulation and infertility. Letrozole tablets mainly exert physiological effects through the central nervous system and peripheral system, which can enhance the sensitivity of the ovaries to FSH, accelerate the development of follicles and ovulation, and increase the thickness of the endometrial lining, which can create favourable conditions for fertilization ^[7]. Menotrophin belongs to the class of sex hormone drugs, after the use of the drug can make the patient's body FSH and LH levels peak, FSH can accelerate follicular development and maturation, and LH can induce luteal development and promote ovulation. Letrozole tablets combined with Menotrophin can regulate the level of sex hormones in the body through multiple pathways, and its effect is significantly better than that of single Letrozole tablets treatment ^[8].

The data of this study proved that the ovulation rate of the observation group was higher than that of the observation group, the number of mature follicles was more than that of the control group, and the thickness of the endometrium was greater than that of the control group, and the difference was statistically significant ($P < 0.05$). The reason is that Letrozole tablets belong to the 3rd generation of aromatase inhibitors through the inhibition of aromatase activity can make the pathway of hormone synthesis and secretion in the patient's body be inhibited to a certain extent, and finally achieve relatively satisfactory therapeutic intervention, so as to reduce the patient's lesion state significantly, and the efficacy of the drug is continuous and stable. Through the analysis of the pharmacological effects of Letrozole tablets, it can be learnt that the drug's regulation and inhibition of hormone transformation is relatively obvious and can achieve the effect of promoting ovulation to a certain extent ^[9]. The main role of Menotrophin is to increase the amount of FSH, LH production, accelerate luteal development, promote follicular development and ovulation, which can be reduced by combining it with Letrozole tablets. Tablets can reduce the stimulation of the ovary, make the single dominant follicle develop and mature, avoid the large number of follicle initiation triggered by the single application of Letrozole tablets, and improve the androgen-dominated internal environment in the patient's ovary, so that the patient's follicle development and ovulation are effectively improved ^[10]. This study confirmed that the pregnancy rate of the observation group was higher than that of the control group, and the rate of preterm delivery was lower than that of the control group, with a statistically significant difference ($P < 0.05$). Analysis of the specific reasons can be seen where the combined application of Letrozole Tablets and Menotrophin can effectively regulate the level of sex hormones, increase the total secretion of estrogen in the late stage of follicular development and the luteal phase after the completion of ovulation, and estrogen can induce the thickening of the endometrium, which can create favourable conditions for pregnancy, and the combination of drugs can reduce the total dosage of drugs, the total dosage of Letrozole tablets has a short half-life, and the effect disappears at the late stage of follicular development, which can reduce the incidence of preterm labour ^[11].

In conclusion, the treatment of PCOS infertility patients with Letrozole tablets combined with Menotrophin can improve sex hormone levels, promote follicular development and maturation and ovulation, increase the pregnancy rate, reduce the rate of preterm delivery, and has the value of promotion and application. The total number of PCOS infertility patients selected in this study is small, and the mechanism of Letrozole tablets combined with Menotrophin treatment still needs to be studied.

Disclosure statement

The author declares no conflict of interest.

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