

The Influence of the Pelvic Floor Muscle Massage on Pregnancy Outcome in Patients Treated with Frozen-Thawed Embryo Transfer

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Abstract

Objective: To research the influence of the pelvic floor muscle massage on pregnancy outcome of patients treated with frozen-thawed embryo transfer (FET).

Methods: We choose 120 patients who will have the frozen-thawed embryo transfer after it is unfreezed, and they are departed into two groups averagely, 60 of observation group and 60 of control group. Both groups start taking estradiol valerate twice a day on the third day of the menstrual cycle, 3mg one time. 14 days later, all patients need to inject progesterone except taking estradiol valerate. The observation group: Starting the pelvic floor muscle massage from the end of menstruation till the day of injecting progesterone, 15-20 minutes, 50 HZ, the acupoints are huiyin and bialiao. The contrast group doesn't have any other therapeutic measures. We will transfer the high-quality embryo on the suitable day. We contrast the basic conditions, the embryo, the endometrial thickness and types of uterine endometrium. To analyze the endometrial blood type, PI, RI, S/D, biochemical pregnancy rate, clinical pregnancy rate and early abortion rate.

Results: There are no statistical result in transferring conditions, the endometrial thickness and types of uterine endometrium. After the treatment, we find that: 1. in the observation group, after the treatment of pelvic floor muscle massage, the endometrial blood of the menstrual 17th day compared with the menstrual 9th day, type I decreases clearly, type II and III increase evidently ($p < 0.05$); 2. in the observation group, after the treatment of pelvic floor muscle massage, we get that the indexes RI, PI and S/D of the menstrual 17th day compared with the menstrual 9th day, reduced remarkably ($p < 0.05$); 3. the observation group of patients after treatment, the menstrual 17th day endometrial blood flow decreased significantly than control group in blood flow I type, type II + III increased significantly ($p < 0.05$); 4. The observation group of patients after treatment, PI, RI and S/D of the menstrual 17th days was lower than control group significantly ($P < 0.05$); 5. in the observation group of patients after treatment, the endometrial thickness compared with the control group was no statistically different ($p > 0.05$), but the endometrial thickness of the observation group was higher than the control group; 6. the implantation rate and clinical pregnancy rate are higher in the observation group than those in the control group.

Conclusion: The pelvic floor muscle massage improves the endometrial thickness and endometrial blood conditions, so as to increase the clinical pregnancy rate of patients with frozen-thawed embryo transfer (FET).

Key words Pelvic floor muscle medical massage, the endometrial blood type, pregnancy rate*Tob Regul Sci.*™ 2021;7(5): 1842 - 1852DOI: doi.org/10.18001/TRS.7.5.106

Introduction

According to the statistics of the World Health Organization (WHO), 5-15% of couples in gestational age have infertility problems. At present, there are nearly 40 million infertility patients in China, and the rate is increasing by hundreds of thousands every year, so that infertility has become the third largest disease inferior to tumor, cardiovascular and cerebrovascular diseases. Therefore, this problem has become a worldwide medical and social problem^[1]. The main reasons for the increase in infertility include the deterioration of environmental quality, increase of sexually transmitted diseases and other infectious diseases, and the excessive social and psychological pressure. In vitro fertilization embryo transfer (IVF-ET), which appeared at the end of the 21st century, is the core part of assisted fertility technology and an important way to treat infertility patients in modern medicine^[2], to bring the hope of fertility for infertile patients. However, the clinical pregnancy rate after embryo transfer (ET) has always been unable to reach a unsatisfactory level (30% ~ 40%). For IVF-embryo transfer patients who are likely to develop severe ovarian hyperstimulation syndrome, embryos can be frozen for resuscitation at a later date to avoid further exacerbation of symptoms; Patients with difficult intrauterine intubation during embryo transfer, waiting for diagnostic results after embryo biopsy and other special reasons who cannot receive fresh embryo transfer can reduce patient burden and increase cumulative pregnancy rate through freeze-thaw embryo transfer technology. Therefore, embryo freezing has become one of the routine techniques in fertility centers. However, how to improve endometrial receptance of freeze-thaw embryo transfer patients to achieve the most suitable endometrial thickness for embryo implantation, and how to grasp the transfer opportunity to improve the success rate of freeze-thaw embryo transfer is a common problem faced by fertility centers.

Our research adopts the method of integrated traditional Chinese and western medicine to improve the endometrial receptivity to reach the most suitable endometrial thickness for embryo implantation so as to improve the success rate of freeze-thaw embryo transfer. Acupoint massage of traditional Chinese medicine has a long history in the diagnosis and treatment of infertility. It is one of the precious legacies of Chinese medicine. By regulating the balance of Yin and Yang, it can regulate and strengthen the functions of visceral functions in both directions. Cooperating with drugs can improve the absorption of drugs, enhance the play of medicinal properties, reduce the possible toxic and side effects of drugs; It can be seen that the combination of acupoint massage of Chinese medicine and assisted reproduction is worthy of further research and discussion.

In this study, the medical massager produced by Shanghai Shengsheng Medical Equipment Co., Ltd. was used to massage the pelvic floor muscles instead of the traditional massage, and the motor was used as the vibration element to massage the pelvic floor of the human body through the ergonomic massage pad. Through specific vibration frequency and intensity, this massager stimulates the pelvic floor muscles, so that the massage site can dredge the meridians, muscle contraction, accelerate blood circulation, and increase the ovary-uterine blood perfusion rate during embryo implantation^[3-6], so as to increase the pregnancy rate in IVF-ET and improve the pregnancy outcome. Therefore, the combination of pelvic floor muscle massage and Assisted Reproductive Technology (ART) is worthy of further research and discussion. Compared with traditional massage, pelvic floor muscle massages are safer, non-invasive, painless, and easy for patients to accept. More importantly, they can clearly quantify the intensity of stimulation with high repeatability. The emergence of pelvic floor muscle massage perfectly combines traditional massage technology with modern ART technology, which is more conducive to clinical promotion and scientific research, and provides a broader space for the development of ART technology.

Date Resource

A total of 120 patients who received freeze-thaw embryo transfer in the Reproduction Center of the Second Affiliated Hospital of Shandong University of Traditional Chinese Medicine from May, 2012 to January, 2013 were enrolled in this study.

Diagnostic criteria

Diagnostic criteria of infertility

(1) Diagnostic criteria of Western medicine:

A person who has had normal sex and has not become pregnant for a year without contraception is known as infertility. Those who have never been pregnant without contraception are called primary infertility; Those who have had pregnancy and then had no contraception for a consecutive year of infertility are called secondary infertility. (Refer to the textbook of Obstetrics and Gynecology, People's Medical Publishing House, 7th edition)

(2) Diagnosis and treatment standards of integrated traditional Chinese and western medicine^[7] :

Couples cohabiting, normal sexual life, not contraception for 1 year not pregnant for infertility.

Indications and contraindications for in vitro fertilization-embryo transfer (IVF-ET)

According to the Notice of the Ministry of Health on the Revision of Technical Specifications, Basic Standards and Ethical Principles Related to Human Assisted Reproductive Technology and Human Sperm Banks (Health Science and Education Issue [2003] No.176)]

Indications

- (1) the woman due to fallopian tube factors caused by sperm and egg difficulties;
- (2) ovulation disorder;
- (3) endometriosis;
- (4) Male less, asthenospermia;
- (5) Unknown infertility;
- (6) Immune infertility in women.

contraindications

Patients with any of the following conditions shall not undergo in vitro fertilization - embryo transfer and related techniques for pregnancy.

- (1) severe mental illness, acute infection of the genitourinary system or sexually transmitted diseases of either male or female;
- (2) suffer from genetic diseases that are not suitable for reproduction according to the Maternal and Infant Health Law and cannot be diagnosed by preimplantation genetics at present;
- (3) Either party has serious adverse addictions such as drug abuse;
- (4) Either party is exposed to teratogenic rays, poisons, drugs and is in the action period.

Inclusion criteria

- (1) Patients who meet the diagnostic criteria of Western medicine for infertility;
- (2) comply with the IVF-ET indications stipulated in the Notice of the Ministry of Health on the Revision of Technical Specifications, Basic Standards and Ethical Principles Related to Human Assisted Reproduction Technology and Human Sperm Banks (No. 176 [2003] of the Ministry of Health);
- (3) No history of estrogen or progesterone drug use in recent 3 months;
- (4) No pregnancy was obtained by transplantation of fresh embryos during the egg collection cycle;
- (5) to avoid the occurrence of severe ovarian hyperstimulation syndrome;
- (6) Fresh cycle endometrium is too thin or endometrium lesions are not suitable for transplantation.

Exclusion criteria

- (1) Conform to the contraindication of IVF-ET stipulated in the "Notice of the Ministry of Health on the Revision of Technical Specifications, Basic Standards and Ethical Principles Related to Human Assisted Reproductive Technology and Human Sperm Banks" (No. 176 [2003] of the Ministry of Health);
- (2) Endocrine diseases such as hypertension and diabetic hyperthyroidism were excluded;
- (3) Patients older than 40 years or with low ovarian response;
- (4) Patients whose cycle was cancelled due to factors such as embryo quality and sudden disease on the day of transplantation;
- (5) Patients who are unwilling to participate in the study or do not insist on cooperation.

Methods

A total of 120 patients underwent freeze-thaw embryo transfer after failed IVF/ICSI-ET treatment or cancelled fresh embryo transfer in the Second Affiliated Hospital of Shandong University of Traditional Chinese Medicine were collected, including 60 in the observation group and 60 in the control group. Fill in the observation form according to the requirements of the clinical trial.

Table 1 The final enrollment of patients in the two groups

Group	Total random enrolments	Final number of enrollments	Exclude group ^a	Exclude the group number ^b
Observation group	60	54	2	4
The control group	60	52	4	4
Total	120	106	6	8

Note: A was unable to perform embryo transfer due to poor embryo quality after resuscitation or the patient's own reasons, a total of 6 patients. B. The follow-up data could not be collected completely due to refusal of treatment inclusion or contact interruption during treatment, a total of 8 patients.

During the freeze-thaw embryo transfer cycle, patients in both groups were given 3mg Po bid orally on the third day of the menstrual cycle, and progesterone was added after consecutive 14 days, and 150mg Po bid was given daily to progesterone capsules (Zhejiang Xianju Pharmaceutical Co.,Ltd.). Progesterone injection (Zhejiang Xianju Pharmaceutical Co.,Ltd.) 40mg IM QD; On the day of transplantation, three doses of 2000IU im QOD for injection were added, and luteal support was performed.

Observation group received pelvic floor muscle massage with pelvic floor muscle massagator for 15-20 minutes every day until the 17th day of the menstrual cycle, with a frequency of 50Hz, since menstruation was clean.

The specific operations of pelvic floor muscle massage therapy are as follows:

- 1) Preparations: the patient emptied the bladder and the treatment was seated;
- 2) Input power: 40VA;
- 3) Operating frequency: 3400 RPM;
- 4) Pulse frequency 75/ min.

Patients in the control group were not treated with pelvic floor muscle massage, and embryo transfer was performed on the 20th day of menstruation in both groups.

Endometrium development in each group during the transplantation cycle was observed.

The endometrial thickness and type of the two groups were observed by B-ultrasound on the 2nd, 10th and 17th day of the menstrual cycle. B ultrasonic instrument using AOKA -SSD1700 color ultrasonic imaging instrument vaginal probe, sector scanning (probe power 5.0MHz).

The blood flow type and resistance under the endometrium were observed by B-mode ultrasound on the 10th and 17th day of the menstrual cycle in both groups. Through the machine's own software: Peaksystolic velocity (S), end-diastolic blood velocity (D), resistance index [Resistive index, $Ri = (s-d)/S$], Pulsatility index [$PI = (s-d)/V_{mean}$], S/D value, etc.

The subintimal blood flow typing method first used by Chien LW et al. [8] :

TypeI: no endometrial blood flow can be detected;

TypeII: only subendometrial blood flow can be detected;

Type III : blood flow in and under the endometrium can be detected.

Blood flow images at all levels are shown in Appendix 2. After embryo resuscitation, embryos are divided into four levels according to the size, number, morphology, symmetry, morphology and distribution of cytoplasm of blastomole ^[9] :

I grade embryos: blastomere size is uniform, shape is regular, refraction is normal, zona pellucida is complete, no or few fragments (lt; 10%).

II grade embryos: blastomere size is not uniform or irregular shape, slightly poor refraction, complete zona pellucida, fragments < 10%;

III grade embryos: embryo fragments < 50%, the remaining blastomere at least up to the standard of II, with living cell refraction, complete zona pellucida;

IV grade embryos: Embryo fragments ≥ 50%, the remaining blastomere is still active.

The morphology of each embryo is shown in Appendix 1. After the embryos were cultured in vitro and the conditions for transplantation were met, the embryos were transferred under the guidance of transabdominal B-ultrasound, and the routine procedure was used for transplantation. After the patient's bladder was moderately filled, the bladder lithotomy position was taken, and transabdominal ultrasound was performed to understand the uterine position, uterine body and cervical Angle, cervical canal length and cervical radian in detail. The longest sagittal curve of the endometrium (i.e., the inner cervical orifice from the endometrial endometrium) was measured twice, and the average value of both was recorded. According to the direction and flexion of the cervical canal observed by uterine exploration records and B ultrasound, the outer cannula of the transplant tube (Cook Company product, KDPETS 5000 transplantation tube) was curved into the appropriate curvature, and then inserted into the internal opening of the cervix along the endometrium, and then the internal tube was placed in the appropriate position. The embryo was placed in the thickest place of the endometrium or the best place of endometrial echo under ultrasound

Patients were asked to self-test urinary pregnancy test 14 days after transplantation, and the pregnancy outcome of each group was compared.

Biochemical pregnancy: positive urine HCG or blood β -HCG > 10 iu/L; 14 days after transplantation;

Clinical pregnancy: 20 days after biochemical pregnancy was confirmed, pregnancy sac, fetal bud and fetal heart beat were observed in utero under B-mode ultrasound.

Early abortion: loss of embryos during the first 12 weeks of pregnancy.

Statistical Analysis

SPSS13.0 software package was used for statistical analysis. Numeration data was expressed as percentage [n (%)], and 2 test was used. Measurement data were expressed as mean \pm standard error (\pm Se). T-test was used for statistical comparison, and $P < 0.05$ was considered statistically significant.

Result

Comparison of general conditions between the two groups (Table 2)

Group	The number of cases	Average age (years)	BMI(kg/m ²)	Infertility fixed number of year (years)
Observation group	54	31.50 \pm 1.09	22.84 \pm 0.24	3.25 \pm 0.57
Control group	52	31.77 \pm 0.96	23.14 \pm 0.30	3.07 \pm 0.52
P		0.85	0.43	0.82

Note: After comparison, there was no significant statistical difference between the two groups before treatment ($P > 0.05$, independent sample T test).

Comparison of infertility causes between two groups (Table 3)

	Observation group	Control group	P
The man factors	9 (16.67)	8 (15.0)	0.86

The woman factors	31 (56.67)	26 (51.7)	0.57
The two sides factors	14 (26.67)	18 (33.3)	0.33

Note: There was no statistical difference in infertility between the two groups, ($P>0.05$)

Comparison of endometrial and embryonic conditions between two groups

The endometrial thickness, the proportion of type A endometrial, the number of frozen embryos and the number of transplants were compared between 2 groups on the 2nd day of menstrual cycle and the 17th day of menstrual cycle (patients with frozen and thawed embryos) (Table 4) .

Table4 Endometrial and embryo transplantation were compared between the two groups

Group	n	Endometrial thickness on the second day of menstruation	Anterior intimal thickness of progesterone	Number of intima type An(%)	Optimal number of embryo	Number of transplantation
Observation group	54	0.45±0.01	1.19±0.02	49(90.7)	2.83±0.19	2.00±0.21
Control group	52	0.48±0.02	1.16±0.02	41(78.8)	2.6±0.14	1.87±0.76
P		0.18	0.30	0.08	0.33	0.87

Note: Type A intima number was expressed as N (%) and X2 test was used. The other expression methods were mean ± standard error (±SE). Independent sample t test was used. 0.05), the influence of this factor on pregnancy outcome can be excluded. The endometrium was insignificant on day 10.

Comparison of subintimal blood flow types between the two groups (Table5)

Table5 Comparison of subintimal blood flow types between the two groups [n (%)]

Group	Day 10 of menstruation		Day 17 of menstruation	
	Observation group	Control group	Observation group	Control group
N	54	52	54	52
IIItype+IItype	30 (55.6)	31 (60.0)	51★▽ (94.4)	32 (61.5)
Itype	24 (44.4)	21 (40.0)	3 (6.7)	20 (38.5)

Note: ★ Compared with the observation group on the 10th day of menstruation, 0.05; Compared with the control group on the 17th day of menstruation, $p<0.05$. By comparison, there was no statistical difference between the two groups of patients on the 10th day of menstruation (I, ADR + coliform subintimal blood flow type) ($P\geq 0.05$). The types of subendometrial blood flow in the two groups on the 17th day of menstruation were compared: there was no difference between the I and the ADC + endometrial blood flow in the control group on the 17th day of menstruation and the 10th day of menstruation ($P\geq 0.05$); The blood flow of the observation group on the 17th day of menstruation II+ the intimal blood flow of the subtype was significantly increased compared with that on the 10th day of menstruation ($P\leq 0.05$); On the 17th day of menstruation, there was statistically significant difference between the two groups in II+ subtype intimal blood flow ($P\leq 0.05$). X2 test is used for all the above.

Intimal blood flow index was compared between the two groups (Table 6)

Table6 Intimal blood flow index was compared between the two groups ($\bar{X} \pm SE$)

	Day 10 of menstruation			Day 17 of menstruation		
	Observation group (N) 54	Control group (N) 52	P	Observation group (N) 54	Control group (N) 52	P
PI	2.07±0.04	2.13±0.01	0.15	1.86±0.02★	2.01±0.05	0.01
RI	0.75±0.01	0.8±0.03	0.12	0.65±0.02▽	0.75±0.02	0
S/D	3.28±0.03	3.31±0.03	0.48	2.96±0.04▼	3.23±0.03	0

Note: ▼, ★, ▽ refer to the comparison of blood flow index between the observation group on the 17th day of menstruation and the 10th day of menstruation, $p < 0.05$. By comparison, there were no significant differences in PI, RI, S/D values between 2 groups on the 10th day of menstruation ($P > 0.05$, independent sample t test). The values of PI, RI and S/D in the observation group on the 17th day of menstruation were lower than those on the 10th day of menstruation, and there were significant differences ($P < 0.05$, paired sample t test) there were no significant differences in PI, RI, S/D values in the control group on the 10th day and the 17th day of menstruation ($P > 0.05$, paired sample t test).

6.4.2 Comparison of pregnancy outcomes between the two groups (Table 7)

Table7 Comparison of pregnancy outcomes between the two groups [n (%)]

Group	N	Biochemical pregnancy	Clinical pregnancy	Early abortion
Observation group (a)	54	34 (62.96)	32 (59.26)	1 (1.85)
Control group (b)	52	22 (42.31)	20 (38.46)	2 (3.85)
P		0.03	0.03	0.54

Note: By comparison, biochemical pregnancy rate and clinical pregnancy rate in observation group were significantly higher than those in control group, $P < 0.05$, the difference was statistically significant (X2 test); The early abortion rate between the two groups was not statistically significant, $P > 0.05$, but the observation group was lower than the control group.

Discussion

Frozen -thawed embryo transfer (FET) is a further therapeutic measure after failure of in vitro fertilization (IVF)/ICSI [10]. The theoretical basis of frozen embryo storage is that tissue cells can inhibit the rate of metabolism and biochemical reaction during cryopreservation, so that frozen and thawed embryos can survive. Moreover, it increases the cumulative pregnancy rate [11], reduces the risk of multiple pregnancy during IVF cycle and reduces the incidence of moderate and severe ovarian hyperstimulation syndrome (OHSS) [12]. As is known to all, the key to successful pregnancy of freeze-thaw embryo transfer is the synchronicity of endometrium and embryo development [13]. Embryo implantation is allowed only when the embryo develops to the blastocyst stage and the endometrium also proliferates and differentiates to a tolerant state. The synchronicity of the two is a necessary condition to ensure successful embryo implantation [14]. In FET, too thick or too thin endometrium will affect embryo implantation. How to prepare the endometrium for freeze-thaw embryo transplantation is an important topic that needs to be discussed in the reproductive medicine field. Therefore, the best endometrial preparation scheme is the key to ensure successful

implantation. Currently, there are various endometrial preparation schemes for freeze-thaw embryo transfer, among which natural cycle, hormone replacement cycle and ovulation induction cycle are most commonly used in our center. The natural cycle is widely used in clinical practice because it does not require any exogenous hormones. Ovulation monitoring, timely selection of embryo transfer time, no special luteal support at later stage, simple control, is a widely recognized endometrial preparation program. However, its application is limited, as it must have natural ovulation, which does not have its advantages for women with irregular menstruation, ovulation disorder and low ovarian reserve. Moreover, ultrasound tests are carried out more often [19]. If there is anovulation or follicular luteinization, embryo transfer will be cancelled, so the cancellation rate of this treatment scheme is high. Although the number of developing follicles and the high concentration of endogenous estrogen in the ovulation induction cycle are helpful for the patients with poor endometrial response, the cost is high, frequent monitoring is required, and the risk of OHSS is faced. Hormone replacement is also widely used in the endometrial preparation of FET due to its good consideration of the patient's ovarian function and convenience in the arrangement of time and schedule [20].

Furthermore, previous studies have shown that clinical outcomes similar to those of natural cycles can be obtained by using artificial cycles [21,22]. It is suggested that the hormone replacement cycle can synchronize the development of endometrium and embryo, which can achieve the same effect compared with the natural cycle. And compared with the natural cycles and stimulate ovulation cycle, hormone replacement cycle can obtain satisfactory pregnancy rate, less oviposit abnormal situation, the individual difference is not big, time is relatively easy to control, the scope of its application in addition to the patients with ovarian function or ovulation disorders also extended to some patients with normal ovulation menstrual rule, its economic, effective and simple method for membrane preparation.

Endometrial blood flow is one of the influencing factors of endometrial receptivity. At present, the most commonly used blood flow parameters are blood pulsation index (PI) and resistance index (RI). It is generally believed that high PI and RI reflect increased blood flow resistance, reduced uterine artery blood flow, poor uterine blood perfusion, and blood supply obstacles, which may be one of the reasons for low pregnancy rate. The study found that before embryo transfer, PI and RI of uterine artery blood flow in patients receiving IVF-ET treatment were measured, and there were significant differences between pregnant group and non-pregnant group. It was believed that the Doppler spectrum of uterine artery was related to the time of endometrium receiving embryos, and PI and RI were effective indicators to predict the outcome of IVF-ET [25]. Cheng Wen ET al. [26] believed that endometrial hemodynamic perfusion indexes could better reflect endometrial receptivity, so as to guide clinical medication to improve endometrial function and select the time of transplantation, which would have a profound impact on improving the implantation rate and pregnancy rate of IVF-ET.

Therefore, how to improve the endometrial blood flow distribution during the hormone replacement cycle, reduce the blood flow resistance and increase the pregnancy rate is a problem to be solved at present. Pelvic floor muscle massage device with the motor as a vibration source, through a specific vibration frequency and intensity, to stimulate the pelvic floor muscles, massage parts to dredge the meridians, muscle contraction, accelerate the effect of blood circulation. Pelvic floor muscle massage regulates the balance of Yin and Yang, regulates the profit and loss of Qi and blood in the viscera, strengthens the function of the viscera, and improves the ovary-uterine blood perfusion during embryo implantation [28-32], thus improving the pregnancy rate. It is simple to operate and low-cost.

Infertility patients with pelvic floor muscles for a long time not exercise, poor contractility, can not congestion, resulting in pelvic organ ischemia, nutritional deficiency. Secondary infertility patients because of previous pregnancy, so that the pelvic floor muscle pressure is too large, muscle fiber deformation, muscle tension, pelvic muscle relaxation. Pelvic floor muscle weakness syndrome and pelvic congestion syndrome can lead to reduced uterine blood filling, endometrial dysplasia, embryo implantation difficulties, so that the number of infertility patients increased. In conclusion, pelvic floor muscle massage can significantly improve the function of pelvic floor muscles, improve endometrial development, and increase the clinical pregnancy rate by massaging pelvic floor muscles.

Pelvis floor muscle massage can improve endometrial receptivity. At present, studies on endometrial receptivity mainly focus on Pinopodes, subendometrial blood flow, Integrins, leukemia inhibitory factor (LIF) and other aspects. The pelvic floor muscle massage mainly affects the blood flow under the endometrium. As early as 2002, Chien LW et al. proposed that transvaginal 3D ultrasound could be used to measure the endometrial volume and evaluate the endometrial and subendometrial vasculization as a new objective index to predict endometrial receptivity [34]. Compared with other monitoring indexes, the method of subintimal blood flow monitoring is simple, non-invasive, and more suitable for clinical studies with large sample size. At present, subendometrial blood flow has been used as the evaluation standard of endometrial receptivity in many existing studies [35,36]. All studies believe that the higher the degree of endometrial blood flow diffusion is, the better the endometrial receptivity is, and the more helpful it is for the improvement of pregnancy rate [37]. In many studies on improving endometrial receptivity, it has been found that the smaller the blood flow resistance under the endometrium and the closer the blood vessel distribution is to the inner endometrium, the higher the pregnancy rate [38-40].

Pelvic floor muscles massage can effectively improve the clinical pregnancy rate mechanism of muscle contraction induced by massage, increased intra-abdominal pressure, speed up the pelvic blood flow, reduce uterine artery blood flow resistance and increase endometrial blood flow and perfusion, thus improve the endometrial thickness and structure, improved the activity of uterus, ovarian function and hormone levels, intrauterine environment improvement, pinocytosis development, The expression of integrin and leukemia suppressor was enhanced, and endometrial receptivity was increased, which was conducive to embryo implantation.

Conclusion

A total of 120 patients receiving freeze-thaw embryo transfer in the reproductive center of our hospital from May 2012 to January 2013 were selected and randomly divided into observation group and control group. The local uterine blood perfusion and pregnancy outcome of each group were discussed and analyzed. The study found that pelvic floor muscle massage increased endometrial thickness and effectively improved local uterine blood perfusion, which improved the type of intimal blood flow, thereby improving the clinical pregnancy outcome and increasing the pregnancy rate of patients with freeze-thaw embryo transfer.

In general, the medical massager produced by Shanghai Sang Sheng Medical Equipment Co., Ltd. was used in this study to massage pelvic floor muscles instead of traditional massage, and the motor was used as the vibration element to massage the pelvic floor of human body through the ergonomic massage pad. It provides a broader development space for the development of ART technology. Compared with previous studies, this is a major breakthrough, but the sample size collected is still small. The sample size should be further increased to improve the credibility of the study. In terms of mechanism research, the molecular mechanism of the effect of pelvic floor muscle massage on pregnancy outcome remains to be further studied.

Conflicts of Interest

the authors declare that they have no conflicts of interest.

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