Taiwanese Journal of Obstetrics & Gynecology 59 (2020) 282–286

Contents lists available at ScienceDirect

Taiwanese Journal of Obstetrics & Gynecology

journal homepage: www.tjog-online.com

Original Article

Effectiveness of acupuncture on pregnancy success rates for women undergoing in vitro fertilization: A randomized controlled trial

Pinar Gursoy Guven [a], Yasemin Cayir [a, *, 1], Bunyamin Borekci [b]

[a] Ataturk University Faculty of Medicine, Department of Family Medicine, Erzurum, Turkey
[b] Ataturk University Faculty of Medicine, Department of Obstetrics and Gynecology, Erzurum, Turkey

ARTICLE INFO

Article history:
Accepted 25 November 2019

Keywords:
Acupuncture
Embryo transfer
Infertility
In vitro fertilization
Pregnancy

ABSTRACT

Objective: To investigate the effect of acupuncture on pregnancy success rates applied before and after embryo transfer (ET) among women undergoing in vitro fertilization (IVF).
Materials and methods: In this randomized controlled trial, 72 infertile women undergoing IVF were randomized to acupuncture (AG; n = 36) and control group (CG; n = 36). Three sessions of acupuncture were applied to AG, the first was one week before ET, the second was 30 min before ET, and the third was 30 min after ET. CG received no acupuncture. The primary outcome was pregnancy success rate (Beta-HCG level, clinical pregnancy, ongoing pregnancy, live birth). Secondary outcome was anxiety level (STAI-1 state anxiety scale). Beta-HCG levels were assessed for conception 12 days after ET. Additionally, STAI-1 state anxiety scale was administered 30 min before and after ET to measure anxiety levels in both groups.
Results: The mean age was 30.9 ± 3.7 years. Positive Beta HCG was detected in 63.9% (n = 23) of the AG and 33.3% (n = 12) of CG (p = 0.009). Clinical pregnancy, ongoing pregnancy, and live birth rates were higher in AG (p < 0.05). There was no difference between the groups concerning anxiety scores before ET (p > 0.05). The mean STAI-1 score was decreasing from 57.3 ± 9.8 to 28.8 ± 3.3 in AG, while it was decreasing from 57.0 ± 8.0 to 41,1 ± 6,8 in CG after ET (p < 0.000).
Conclusions: It was observed that three sessions of acupuncture before and after ET significantly increased the pregnancy rates in women with unexplained infertility. It was also found that acupuncture significantly reduced anxiety levels that occurred before ET.

Introduction

Infertility is an inability to achieve pregnancy after regularly unprotected coitus for one year [1]. Nowadays, an alarming number of women around the world are experiencing infertility. Infertility rates were reported as 6% in America, 10–15% in England, 15% in Australia, and 10–15% in Japan among married population [1–4]. In Turkey, it is estimated that 10–20% of the couples are diagnosed with infertility. In vitro fertilization (IVF) is presently one of the last treatment options for infertility as an Assisted Reproductive Technology. Since 1978, it has become a widely accepted method of treatment for infertile couples [5].

IVF is an invasive and expensive process. It is estimated that pregnancy rates in IVF applications are 30–35% globally [6]. The success rate of IVF can be influenced by many factors such as woman's age, co-morbid situations, and experiences of physician [7]. IVF treatment also has high costs for public finance and patients. Therefore, it is significant to increase success rate of IVF. Before IVF process, some procedures such as complementary therapies are used to improve pregnancy rates for infertile females. To practice acupuncture as a complementary therapy during IVF is increasing all around the world. Acupuncture has been used for hormone regulation, increasing uterine blood flow and stimulating secretion of endogenous opioids [8]. However, until to now there is no standard acupuncture protocol described for infertile women who are in IVF process.

We conducted a randomized controlled trial to determine whether acupuncture sessions with embryo transfer (ET) improves the success rates of pregnancy among infertile women undergoing in vitro fertilization.

* Corresponding author. Fax: +904422361301
E-mail address: dryasemincayir@yahoo.com (Y. Cayir).
[1] Ataturk University, Research and Practice Center for Acupuncture and Complementary Therapy Modalities Erzurum, Turkey.

https://doi.org/10.1016/j.tjog.2020.01.018

Methods

Study design

This trial was carried out between December-2017 and January-2018 at Ataturk University Research and Practice Center for Acupuncture and Complementary Therapy Modalities, Turkey. It was performed in adherence to Helsinki Declaration which is a guideline for clinical trials [9]. The acupuncture treatment was documented in accordance with Standards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA) [10]. It is illustrated in Fig. 1. Acupuncture was performed by the acupuncturist who has acupuncture practitioner license from Turkish Ministry of Health. The written informed consent form was obtained from all the participants. The study protocol was approved by the ethics committee of Ataturk University Faculty of Medicine (Protocol number: B.30.2.ATA.0.01.00/120). This study is registered on the website of ClinicalTrials.gov (www.clinicaltrials.gov) with the number of NCT 03572608. This study was supported by the Scientific Research Projects Fund of Ataturk University (Project Number: TTU-2018-6422).

Patients

From December 2017 to January 2018, a total of 95 unexplained infertile women have visited Ataturk University Obstetric and Gynecologic Outpatient Department seeking for IVF. Inclusion criteria were being aged 23–45 years, diagnosed unexplained infertility, and undergoing a fresh IVF. Unexplained infertility was accepted as not to have any common causes of infertility using standard fertility investigations. Exclusion criteria included having an underlying fertility problem, any co-morbidity or uncontrolled systemic diseases such as hypertension, diabetes, chronic heart disease or chronic renal disease that can affect the treatment process, and any acupuncture treatment during the previous one-year. After baseline evaluation by a gynecologist, eligible patients ($n = 76$) were enrolled in the study. A total of 76 unexplained infertile women were randomized to acupuncture (AG; $n = 38$) and control group (CG; $n = 38$). The secretary in the IVF clinic generated a random allocation sequence for the participants who meet the inclusion criteria. Three sessions of acupuncture were applied to AG, the first session was one week before ET, the second session was 30 min before ET, and the third session was 30 min after ET. CG received no acupuncture. Four of the patients had incomplete data, so the results from 72 patients were used in the final analysis (Fig. 1). Day 3 and fresh embryo transfer were used in all participants. Patients were compared in terms of Beta-HCG positivity, clinical pregnancy, ongoing pregnancy, and live birth rates and anxiety levels.

It was calculated that a sample of 77 patients provided a statistical power of 85% for determining a difference in Beta-HCG positivity with an α error of 5% by G-power© program.

Intervention

Classical body acupuncture points were used without a formal Traditional Chinese Medicine (TCM) diagnosis in the AG. All acupuncture points were selected and localized on the basis of the WHO Standardized Acupuncture Point Location [11]. The points selected were bilateral H-7, LI-4, GV-20, ear shenmen for the first session. Bilateral CV-3,4,6, GV-20, LIV-3, ST-30, and SP-8 were selected for the second session. Bilateral LI-4, SP-6,9, and ST-36 were selected for the third session. The selected acupoints and the effectiveness of these acupoints based on TCM are illustrated in Table 1 [12]. Neither needle stimulation nor moxa-therapy was used. Needles were 0.25×25 mm and stainless steel. Sterile and single-use needles were used for every acupuncture session. Depth of insertion was 1–2 cun (one cun is with of thumb). The needles were left in place for 30 min. Adverse events were monitored for all sessions.

Measurements

All patients were assessed for conception 12 days after ET with Beta-HCG levels. It was accepted as positive above 5.0 mIU/ml. Participants with positive Beta-HCG were monitored for clinical pregnancy, ongoing pregnancy, and live birth rate. Additionally, STAI-1 state anxiety scale was administered before 30 min and after 30 min ET to measure anxiety levels in both groups. STAI-1 was developed by Spielberg, and Turkish validity and reliability analysis of the scale was performed by Öner et al. [13,14]. STAI-1 is a self-assessment questionnaire. The questionnaire contains 20 items rated on 4 point. The score obtained from the reversed items is subtracted from the score obtained from the non-reversed items. The score obtained from the two sub-dimensions (state anxiety; trait anxiety) ranges between 20 and 80. Higher scores indicate that the higher anxiety level.

Statistical analysis

Statistical analysis was performed using SPSS version 23.0 software (IBM Corp., Armonk, NY, USA). Numerical variables are expressed in mean ± standard deviation and categorical variables in numbers and percentages (%). Numerical data were analyzed for normal distribution by Skewness. Independent sample *t*-test and χ^2 test were used to analyze the differences between the groups. $P < 0.05$ was set as the threshold for significance.

Results

The mean age of participants was 30.9 ± 3.7 years. Both AG and CG had similar baseline characteristics in terms of age, occupation, education level, body mass index (BMI) and number of IVF ($p > 0.05$). Baseline characteristics of participants are shown in Table 2.

IVF data of the groups is demonstrated in Table 3. According to these data, there were no statistical differences in terms of gonadotropin dose, number of oocytes retrieved, number of mature oocytes, number of embryos collected, number of embryos transferred, thickness of endometrium and estradiol level of hCG trigger day ($P > 0.05$).

The comparison of the pregnancy success rates between AG and CG is presented in Table 4. Positive Beta HCG was detected in 63.9% ($n = 23$) of the AG and 33.3% ($n = 12$) of CG ($p = 0.009$). There were statistically significant differences between the groups as regards clinical pregnancy rate (63.9% versus 33.3%), ongoing pregnancy rate (55.6% versus 30.6%), and live birth rate (52.8% versus 40.3%) ($p < 0.05$).

No significant differences were determined in mean STAI-1 scores before ET between the groups ($p > 0.05$). STAI-1 score was 57.3 ± 9.8, and 57.0 ± 8.0 before ET respectively among groups (Table 5). The mean STAI-1 score was 36.1 ± 6.3 just after the second acupuncture session in AG. The mean STAI-1 score was decreasing to 28.8 ± 3.3 in AG, while it was 41,1 ± 6,8 in CG after ET ($p < 0.000$). The anxiety scores decreased significantly after the second and the third acupuncture sessions compared with baseline values ($p < 0.001$). According to STAI-1, anxiety scores reduced in ratio 49.7% in AG, and 27.8% in CG after ET.

The results of the comparisons of the STAI-1 scores before ET and Beta HCG test results are demonstrated in Table 6. According to

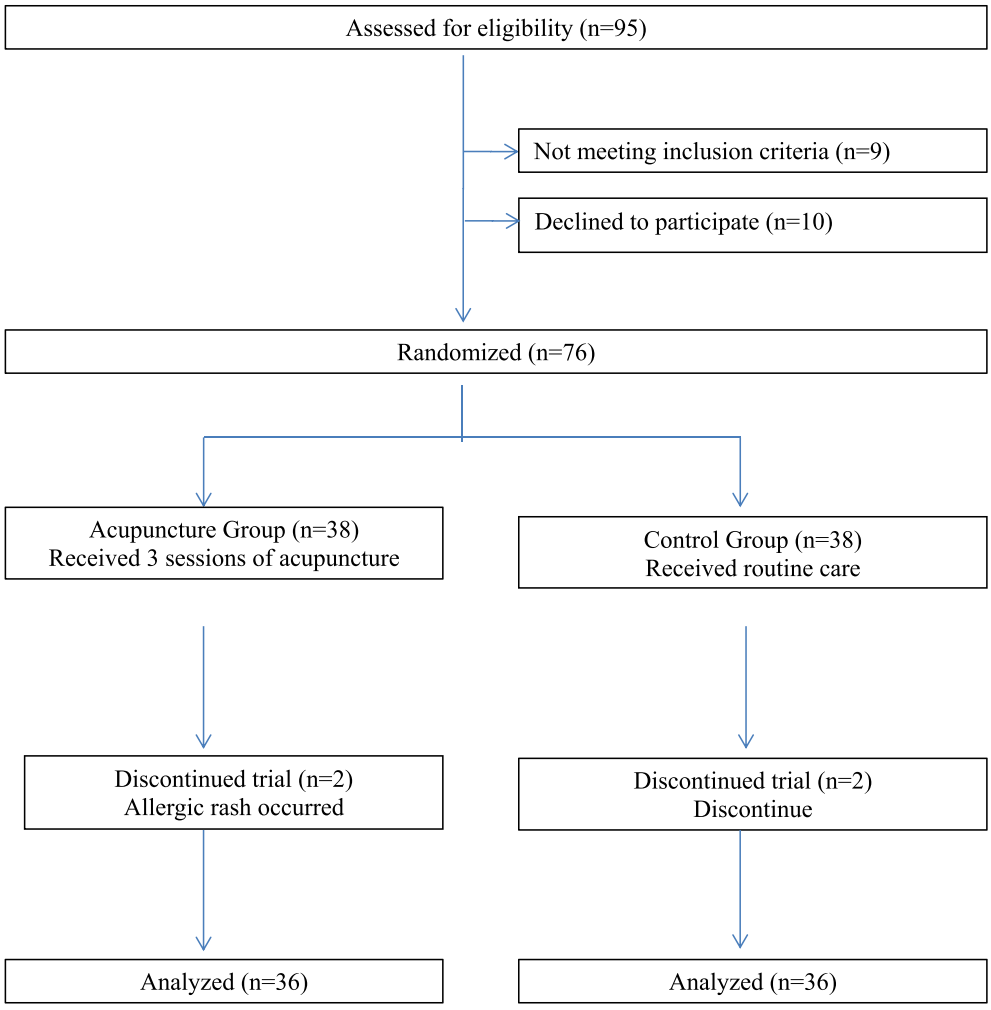

Fig. 1. CONSORT flow chart of the patients.

this analyzes, participants with high STAI-1 score showed more negative pregnancy test results ($p < 0.05$).

Discussion

The results of this clinical trial demonstrated that three sessions of acupuncture treatment could result significant increase the pregnancy rates in infertile women undergoing IVF treatment. In addition, acupuncture treatment could decrease anxiety levels that occur before ET.

Clinical studies have shown that acupuncture is an effective therapy method for infertility. A recent meta-analyses indicate that acupuncture increased the odds of clinical pregnancy by 65% compared with CGs [8]. Villahermosa et al. conducted a study; they reported that acupuncture increased clinical pregnancy rates during IVF treatment [15]. Acupuncture's regulator effect on hypothalamic–pituitary–ovarian axis may influence the ovulation,

Table 1
The effects of the each selected acupoints.

General effects of the acupoints for the each session	Acupoints	Effect of acupoints according to TCM
1. session	H-7	Calms the shen
Reduce anxiety, calm the sprit	LI-4	Clears the heat
	GV-20	Pacifies the spirit, releases cramps
	Ear shenmen	Calms the shen
2. session	CV-3,4,6	Increase and regulate Qi, regulate uterus
Facilitate cervical opening, relax uterus, decrease uterine contractions, assist embryo implementation	GV-20	Pacifies the sprit, releases cramps
	LIV-3	Expels wind, transforms dampness, strengthens spleen
	ST-30	Promotes fertilization, regulates and tonifies chong mai
	SP-8	Regulates uterus function, expels dampness
3. session	LI-4	Clears the heat
Support blood circulation in the uterus, maintain implantation of the embryo, nourish embryo growth, relax the uterus, prevent uterine contractions	SP-6	Resolves and expels dampness, restores balance to Yin and blood
	SP-9	Expels dampness
	ST-36	Strengthens the body, restores balance to Qi

Table 2
Comparisons of baseline features of the groups.

	AG	CG	P Values
	n = 36	n = 36	
Age (year) (mean ± SD)	30.3 ± 3.4	31.5 ± 4	0.17
Occupation n(%)			
Do not have	27 (%51.9)	25 (%48.1)	0.59
Have	9 (%45)	11 (%55)	
Education level n(%)			
<8 years	7 (%46.7)	8 (%53.3)	0.89
8–12 years	19 (%52.8)	17 (%47.2)	
>12 years	10 (%47.6)	11 (%52.4)	
BMI (kg/m^2) (mean ± SD)	24.4 ± 3.0	23.3 ± 1.9	0.06
IVF number (mean ± SD)	1.97 ± 0.8	1.83 ± 0.7	0.47

SD, Standard Deviation; BMI, body mass index.

ovarian blood flow, uterine blood flow and uterine contractions [16]. Huang et al. indicated that acupuncture increased uterine and ovarian blood flow and also helped the implantation of the embryo via reducing uterine motility [17].

Acupuncture around the time of ET could improve pregnancy success rate through some of probable effect. Increasing uterine blood flow, improving endometrial receptivity, and reducing stress level are known as major mechanism [18]. The acupuncture points used in this trial were selected according to the principles of TCM and our clinical experiences. While some of these points affect ovulation via acting on central and peripheral nervous system, neuroendocrine system and endocrine system modulation; a part of these points increase uterine blood flow or inhibit uterine motility [12].

The selected points used one week before ET (H-7, LI-4, GV-20) regulate mental status and generate homeostasis. It is known that mental status of women may lead to reduced fertility. In addition, balancing homeostasis is one of the required factors for fertilization [12,19].

CV-3,4,6, LIV-3, ST-30, and SP-8 which were used just before ET have effect on facilitation of embryo implementation. CV-3,4,6 also have regulating effect on uterus [12,20,21]. ET is a painful procedure. In a previous study, it was demonstrated that the pain during ET has a correlation with pregnancy possibility [22]. LIV-3 is an effective acupuncture point for reducing pain. These points were used in some previous study. It was shown that these acupuncture points also can facilitate ET stage by relaxing the uterus, dilating the cervical opening, and calming the patient [12,23]. In the present study, the used acupuncture points before ET assisted the process by achieving the facilitator effects.

To support blood circulation in the uterus, to maintain implantation of the embryo, and to nourish growing of embryo are significant after the ET. To provide relaxing of the uterus may prevent uterine contractions, uterine bleeding and abortion in this period. The selected points after the ET were shown that have effect all of these factors. Furthermore, it is thought that modulation of immune system can be achieved by acupuncture that affects the production of cytokines. According to TCM, ST-36 is an immune modulator point that can trigger release of some kinds of cytokines. Some trials have proposed that the use of LI-4 or SP-6 can trigger uterine contractions, however these points can be used before pregnancy test. In addition, suppression in the expression of COX-2 enzyme in the uterus had been shown after needling LI-4 [5,12,15].

Smith et al. conducted a Delphi study in order to determine an acupuncture protocol as an adjunct to IVF. Most of the experts were strongly agree with usage of ST-36, CV-4, P-6, Yin Tang and GV-20 during ET. The experts of this trial recommended dosing studies for future research of acupuncture administered during IVF [18]. We believe that our study described a new effective treatment protocol by practicing the acupuncture points which of them were suggested by acupuncture experts.

Anxiety is a physiological response of human body to traumatic and stressful events. Anxiety is also known as a complicating and reducing factor for fertility. A study suggested that more than 80% of women had anxiety in duration of infertility [24]. Anxiety may lead to a reduction in pregnancy success rates during IVF [25]. It is very significant to relieve anxiety and increase the outcomes of IVF treatment. A few of trials have suggested that acupuncture plays an important role in managing anxiety in patients with infertility without causing any serious side effects [26]. Some studies have demonstrated that acupuncture creates an anxiolytic effect via increasing endogenous opioids [5,27]. In particular, the release of endorphins in the central nervous system affects the secretion of gonadotropins. This creates a positive effect on the emotional state, which is an effective factor in ovulation and menstrual cycle changes [8]. Our findings are in line with all these research. In our study, a decrease of close to 50% in mean anxiety scores was

Table 3
IVF data of the groups.

	AG (n = 36)	CG (n = 36)	P values
Dose of gonadotropin (μg) (mean ± SD)	230.55±	225.73±	0.671
Number of oocytes retrieved (mean ± SD)	11.7 ± 7.1	10.9 ± 5.2	0.630
Number of mature oocytes (mean ± SD)	8.4 ± 5.8	8.9 ± 4.1	0.700
Number of embryos collected (mean ± SD)	4.8 ± 2.0	5.1 ± 1.9	0.485
Number of embryos transferred (mean ± SD)	1.4 ± 0.6	1.5 ± 0.7	0.632
Thickness of endometrium (mm) (mean ± SD)	9.9 ± 1.5	9.±1.0	0.283
Estradiol level of hCG trigger day (pg/mL) (mean ± SD)	2695 ± 1648	3134 ± 1640	0.304

Table 4
Pregnancy success rates.

	AG (n = 36)	CG (n = 36)	P Value
Beta HCG positivity rate n (%)	23 (63.9)	12 (33.3)	*0.009**
Clinical pregnancy rate n (%)	23 (63.9)	12 (33.3)	*0.009**
Ongoing pregnancy rate n (%)	20 (55.6)	11 (30.6)	*0.032**
Live birth rate n (%)	19 (52.8)	10 (27.8)	*0.031**

*statistical significance.

Table 5
STAI-1 scores results of the groups.

STAI-1 Scores	Acupuncture Group (n = 36)	Control Group (n = 36)	P Values
Before Embryo Transfer	57.3 ± 9.8	57.0 ± 8.0	0.876
After Embryo Transfer	28.8 ± 3.3	41.1 ± 6.8	*0.000*

*statistical significance.

Table 6
Comparisons of the STAI-1 scores before ET and pregnancy test results.

Groups	Pregnancy Test	n	STAI-1 Score Before ETMean ± SD	P value
AG (n = 36)	Beta HCG Positive	23	56.8 ± 10.88	0.688
	Beta HCG Negative	13	58.23 ± 8.21	
CG (n = 36)	Beta HCG Positive	12	49.92 ± 5.76	*0.000**
	Beta HCG Negative	24	60.54 ± 6.57	
Total (n = 72)	Beta HCG Positive	35	54,46 ± 9,9	*0,011**
	Beta HCG Negative	37	59,73 ± 7,1	

SD, Standard Deviation; *statistical significance.

observed after sessions of acupuncture treatment. Furthermore, women with low anxiety scores had more pregnancy positivity.

This study evaluated the efficacy and safety of acupuncture for IVF patients. The pregnancy test positivity was higher among AG than CG, as well as anxiety scores were lower in the AG than CG. There was observed no serious side effect after acupuncture treatment.

There are some limitations of this clinical trial. Sham acupuncture group was not included in the study; this may be one of the potential limitations of our study. However, near acupuncture points can be triggered by sham acupuncture. For this reason, to add sham group is not recommended by some authors [28]. On the other hand, this trial demonstrated the positive influence of three sessions acupuncture in a fresh ET process for improving pregnancy success rate. Further researches are needed to demonstrate how acupuncture affects IVF process and pregnancy rates.

Conflict of interest

There is no conflict of interest.

Acknowledgment

We are grateful to Ataturk University Scientific Research Projects Fund Office because of the fund and support.

References

[1] Lindsay TJ, Vitrikas KR. Evaluation and treatment of infertility. Am Fam Physician 2015;91:308–14. 2015/03/31.
[2] Herbert DL, Lucke JC, Dobson AJ. Infertility, medical advice and treatment with fertility hormones and/or in vitro fertilisation: a population perspective from the Australian Longitudinal Study on Women's Health. Aust N Z J Public Health 2009;33:358–64. https://doi.org/10.1111/j.1753-6405.2009.00408.x. 2009/08/20.
[3] Oakley L, Doyle P, Maconochie N. Lifetime prevalence of infertility and infertility treatment in the UK: results from a population-based survey of reproduction. Hum Reprod 2008;23:447–50. https://doi.org/10.1093/humrep/dem369. 2007/11/24.
[4] Kubo H. Epidemiology of infertility and recurrent pregnancy loss in society with fewer children. JMAJ 2009;52:23–8.
[5] Cayir Y, Gursoy PG. In vitro fertilization and acupuncture. Konuralp Tip Dergisi 2018;10:420–3. https://doi.org/10.18521/ktd.442446.
[6] European IVFmC, , European Society of Human R, Embryology, Calhaz-Jorge C, De Geyter C, Kupka MS, de Mouzon J, et al. Assisted reproductive technology in Europe, 2013: results generated from European registers by ESHRE. Hum Reprod 2017;32:1957–73. https://doi.org/10.1093/humrep/dex264. 2017/11/09.
[7] Atlanta GA. Centers for Disease Control and Prevention. Assisted reproductive technology success rates: national summary and fertility clinic reports. 2003. www.cdc.gov/art/art2003. [Accessed 30 January 2019]. 2005.
[8] Manheimer E, Zhang G, Udoff L, Haramati A, Langenberg P, Berman BM, et al. Effects of acupuncture on rates of pregnancy and live birth among women undergoing in vitro fertilisation: systematic review and meta-analysis. BMJ 2008;336:545–9. https://doi.org/10.1136/bmj.39471.430451.BE. 2008/02/09.
[9] Declaration of Helsinki, recommendations guiding doctors in clinical research. Del Med J 1966;38:280. passim. 1966/09/01.
[10] MacPherson H, White A, Cummings M, Jobst K, Rose K, Niemtzow R. Standards for reporting interventions in controlled trials of acupuncture: the STRICTA recommendations. STandards for Reporting Interventions in Controlled Trails of Acupuncture. Acupunct Med 2002;20:22–5. 2002/04/03.
[11] Lim S. WHO standard acupuncture point locations. Evid Based Complement Alternat Med 2010;7:167–8. https://doi.org/10.1093/ecam/nep006. 2009/02/11.
[12] Liang L. Acupuncture & infertility. Boulder: Blue Poppy Press; 2004.
[13] Spielberger CD. Manual for the state–trait anxiety inventory: STAI (form Y). Palo Alto, CA: Consulting Psychologists Press.; 1983.
[14] Öner N, Le Compte A. *Süreksiz Durumluk/Sürekli Kaygı Envanteri El Kitabı*. Istanbul. Boğaziçi Üniversitesi Yayınları; 1983.
[15] Villahermosa DI, Santos LG, Nogueira MB, Vilarino FL, Barbosa C. Influence of acupuncture on the outcomes of in vitro fertilisation when embryo implantation has failed: a prospective randomised controlled clinical trial. Acupunct Med 2013;31:157–61. https://doi.org/10.1136/acupmed-2012-010269. 2013/03/21.
[16] Chen BY, Yu J. Relationship between blood radioimmunoreactive beta-endorphin and hand skin temperature during the electro-acupuncture induction of ovulation. Acupunct Electro-Ther Res 1991;16:1–5. 1991/01/01.
[17] Huang DM, Huang GY, Lu FE, Stefan D, Andreas N, Robert G, et al. Acupuncture for infertility: is it an effective therapy? Chin J Integr Med 2011;17:386–95. https://doi.org/10.1007/s11655-011-0611-8. 2011/05/26.
[18] Smith CA, Grant S, Lyttleton J, et al. Using a Delphi consensus process to develop an acupuncture treatment protocol by consensus for women undergoing Assisted Reproductive Technology (ART) treatment. BMC Complement Altern Med 2012;12:88. https://doi.org/10.1186/1472-6882-12-88. 2012/07/10.
[19] Joseph DN, Whirledge S. Stress and the HPA Axis: balancing homeostasis and fertility. Int J Mol Sci 2017;18. https://doi.org/10.3390/ijms18102224. 2017/10/25.
[20] Sahin A, Cayir Y, Akcay F. Positive effects of acupuncture on menstrual irregularity and infertility in a patient with polycystic ovary syndrome. Fam Med Med Sci 2014;3:121–2. https://doi.org/10.4172/2327-4972.1000121.
[21] Zhu J, Arsovska B, Kozovska K. Acupuncture treatment for fertility. Open Access Maced J Med Sci 2018;6:1685–7. https://doi.org/10.3889/oamjms.2018.379. 2018/10/20.
[22] Saravelos SH, Wong AW, Kong GW, et al. Pain during embryo transfer is independently associated with clinical pregnancy in fresh/frozen assisted reproductive technology cycles. J Obstet Gynaecol Res 2016;42:684–93. https://doi.org/10.1111/jog.12962. 2016/02/27.
[23] Qu F, Wang FF, Wu Y, Zhou J, Robinson N, Hardiman PJ, et al. Transcutaneous electrical acupoint stimulation improves the outcomes of in vitro fertilization: a prospective, randomized and controlled study. Explore 2017;13:306–12. https://doi.org/10.1016/j.explore.2017.06.004. 2017/09/17.
[24] Ramezanzadeh F, Aghssa MM, Abedinia N, Zayeri F, Khanafshar N, Shariat M, et al. A survey of relationship between anxiety, depression and duration of infertility. BMC Women's Health 2004;4:9. https://doi.org/10.1186/1472-6874-4-9. 2004/11/09.
[25] Gdanska P, Drozdowicz-Jastrzebska E, Grzechocinska B, Radziwon-Zaleska M, Węgrzyn P, Wielgoś. Anxiety and depression in women undergoing infertility treatment. Ginekol Pol 2017;88:109–12. https://doi.org/10.5603/GP.a2017.0019. 2017/03/23.
[26] Smith CA, Ussher JM, Perz J, Carmady B, de Lacey S. The effect of acupuncture on psychosocial outcomes for women experiencing infertility: a pilot randomized controlled trial. J Altern Complement Med 2011;17:923–30. https://doi.org/10.1089/acm.2010.0380. 2011/10/08.
[27] Han JS. Acupuncture and endorphins. Neurosci Lett 2004;361:258–61. https://doi.org/10.1016/j.neulet.2003.12.019. 2004/05/12.
[28] Moffet HH. Sham acupuncture may be as efficacious as true acupuncture: a systematic review of clinical trials. J Altern Complement Med 2009;15:213–6. https://doi.org/10.1089/acm.2008.0356. 2009/03/03.