



Original Article

Non-pharmacological interventions involving traditional Chinese medicine for assisted reproductive technology: A group consensus



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ABSTRACT

Background: Assisted reproductive technologies (ART) are being increasingly utilized for mitigating fertility problems. Nonpharmacological interventions of traditional Chinese medicine (TCM) are widely used as an adjunct to ART, which may improve the rate of pregnancy. Currently, no standard treatment guidelines or consensus are available for non-pharmacological interventions of TCM for patients undergoing ART. The aim of this study was to establish a consensus on the use of non-pharmacological TCM interventions during the ART treatment cycle.

Methods: This study utilized existing data and developed a consensus among a panel of experts on non-pharmacological interventions of TCM for ART. Through face-to-face or online contact, the listed recommendations were revised one by one, and a consensus was reached when >70 % of the experts agreed with the recommendation. The writing group of the expert panel then created the first draft of the expert consensus based on the discussion in the first round. The second round was held to reach a consensus on content improvements based on the opinions of the experts in the previous round.

Results: After the literature search, a total of 873 related articles were retrieved, and 59 studies were ultimately included according to the inclusion and exclusion criteria. After two rounds of the survey, a total of 24 experts from 18 Chinese provinces across China and five international experts from the United Kingdom, Korea, and Serbia provided vital insight and support for the formulation of this consensus. The consensus outlines eight non-pharmacological interventions for seven different stages of the ART cycle and three major complications during ART, involving 23 items of clinical practice recommendations.

Conclusions: Expert consensus provides a foundation for integrating non-pharmacological TCM interventions into clinical practice during ART. As more high-quality, large-scale, multicenter clinical trials are conducted, these recommendations may be refined and updated to better inform clinical guidelines and improve patient outcomes in ART.

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1. Introduction

Infertility is a global health issue and has a devastating effect on human reproduction.¹⁻³ The World Health Organization considers infertility a disease state and has ranked it as the fifth most significant global disability.⁴ As medical technology has advanced, a growing number of couples facing infertility concerns are turning to assisted reproductive technology (ART) to conceive, and ultimately birth, healthy offspring.⁵⁻⁶ ART has become an acknowledged medical practice and has immense potential as a method for addressing infertility.⁷ In recent years, the incidence of infertility has increased rapidly in China,⁸ and ART has received increasing attention from the public.

Although artificial insemination and in vitro fertilization and embryo transfer (IVF-ET) have greatly helped infertile couples with reproductive disorders to successfully have children, the ART process remains inefficient.⁹⁻¹⁰ Poor responder patients remain a challenge in ART.¹¹ Adverse outcomes such as implantation failure and miscarriages not only seriously harm both the physical and mental health of women but also negatively impact families, society, and economic development.¹²⁻¹³ Therefore, finding effective collaborative treatment measures to improve the success rate of ART has become a pressing scientific and clinical issue that needs to be addressed.

A series of studies have shown that non-pharmacological interventions involving traditional Chinese medicine (TCM), such as manual acupuncture, electroacupuncture (EA), moxibustion, transcutaneous electrical acupoint stimulation (TEAS) and auricular acupressure (AA), are beneficial for patients undergoing ART and can improve the success rate of ART and offer new hope for patients suffering from infertility.¹⁴⁻²⁰

However, no standard treatment guidelines or consensus are available concerning non-pharmacological interventions of TCM for patients undergoing ART, which is critically needed in the field of complementary medicine. The current consensus focuses on developing a wide range of mainstream non-pharmacological therapies during ART, as well as further improving treatment outcomes and providing standardized guidance in clinical practice.

2. Methods

This study summarizes the existing data and develops a consensus on non-pharmacological interventions involving TCM for ART. PICO elements considered for this study is shown in Table 1.

2.1. Previous clinical guidelines and expert consensus

Our reference guidelines and consensus include the following: Expert consensus on clinical diagnosis and TCM combined with ART for infertility caused by diminished ovarian reserve (2024);²¹ optimizing follicular development, pituitary suppression, triggering and luteal phase support during ART: a Delphi consensus (2021);² a Chinese practice guideline

for ART strategies for women with advanced age (2019);²² effects of a Delphi consensus acupuncture treatment protocol on the levels of stress and vascular tone in women undergoing in vitro fertilization: a randomized clinical trial protocol (2017);²³ a consensus of diagnosis and treatment for complications during ART (2015);²⁴ and the use of a Delphi consensus process to develop an acupuncture treatment protocol by consensus for women undergoing assisted reproductive technology (ART) treatment (2012),²⁵ and a range of different national and international guidelines and consensus were taken into account.

2.2. Review of the literature

2.2.1. Searching the literature and data sources

The databases used include PubMed, Web of Science, EMBASE, CINAHL, Cochrane (the Cochrane Central Register of Controlled Trials), the China Knowledge Resources Database (CNKI), the Chinese Science and Technology Journal Database (Chongqing Vip), the China Academic Journal Database (Wanfang Data), the Airiti Library, the China Biomedical Literature Service System (SinoMed), the U.S. Clinical Trials Database (ClinicalTrials.gov), and the Chinese Clinical Trials Registry (www.chictr.org.cn). The retrieval deadline was September 30, 2024, and the search languages were restricted to Chinese and English because this study focused on TCM and majority of its research is published in Chinese and English.

2.2.2. Literature inclusion and exclusion criteria

- Inclusion criteria

- (1) Clinical studies on the application of integrated traditional Chinese and Western medicine or/and TCM treatment or/and nursing or/and non-pharmacological interventions of TCM for ART.
- (2) Type of study design: systematic review, randomized controlled trials, cohort studies, case-control studies, cross-sectional studies, case series, case reports, single-arm studies, expert experience, etc.

- Exclusion criteria

Nonclinical studies and studies without corresponding efficacy or feasibility data were not considered in this research.

2.3. Expert viewpoints

The existing literature has the disadvantages of an insufficient sample size and inadequate study design, which may lead to deviations in the evaluation of curative effects, and could not meet the GRADE guidelines for high-quality evidence. Therefore, based on information from the literature, clinical experiences, and operational feasibility, the writing group of the expert panel developed the original proposal according to the modified Delphi principle and the PICO principle (patient, intervention, comparison, outcome).²⁶⁻²⁸ We subsequently invited representative experts from China who had been actively engaged in

Table 1
PICO Elements.

PICO Elements	Keywords	Search Term
P (Patient or Population)	Infertility female undergoing ART	Artificial insemination; in vitro fertilization and embryo transfer; pituitary down-regulation; long agonist protocol; GnRH agonist; controlled ovarian hyperstimulation; ovulation induction; ovarian stimulation; controlled ovarian stimulation; implantation window; oocyte retrieval; egg retrieval; analgesia.
I (Intervention)	Using non-pharmacological TCM interventions during ART	Traditional Chinese medicine; acupuncture; electroacupuncture; transcutaneous electrical acupoint stimulation; auricular-acupuncture; auriculotherapy; dry needling; moxibustion; cupping; fumigation; naturopathy; acupoint application; hot compress; external treatment; acupoint catgut embedding; acupressure; music therapy; hyperthermia; massage; tuina.
C (Comparison)	Not using non-pharmacological TCM interventions during ART	-
O (Outcome)	Affects pregnancy outcome and complication	Pregnancy outcome; pain; ovarian hyperstimulation syndrome; emotional disorders; depression; anxiety.

ART, assisted reproductive technology; TCM, traditional Chinese medicine; GnRH, gonadotropin-releasing hormone.

clinical- or scientific-related fields for at least 10 years, as well as international experts who were interested in TCM and were willing to join our expert consensus group. Experts from areas such as reproductive medicine, endocrinology, psychology, obstetrics, gynecology, andrology, nursing, TCM, acupuncture and massage, integrated traditional Chinese and Western medicine, and evidence-based medicine participated in the development process. Through face-to-face or online contact, the listed recommendations were revised one by one, and a consensus was reached when more than 70% of the experts agreed with the recommendation. The writing group of the expert panel then created the first draft of the expert consensus based on the discussion in the first round. To protect anonymity, there was a dedicated secretary in the expert panel who was responsible for communicating with each expert and collecting their opinions, and the experts only contacted the secretary in the first round. The second round was held to reach a consensus on content improvements based on the opinions of the experts in the previous round.

3. Results

After the literature search, a total of 873 related articles were retrieved, and 59 studies were ultimately included according to the inclusion and exclusion criteria (Fig. 1). After two rounds of the survey, a total of 24 experts from 18 Chinese provinces across China and five international experts from the United Kingdom, Korea, and Serbia provided vital insight and support for the formulation of this consensus. Finally, 23 items of clinical practice recommendations were developed. Non-pharmacological TCM interventions are guided by holistic concepts. The

principle of selecting acupoints during different steps of ART is based on tonifying the kidney and promoting Qi and blood. The consensus provides 8 non-pharmacological interventions for seven different stages of the ART cycle and three major complications during ART (Table 2). These 8 non-pharmacological TCM interventions are classified as contact, non-contact, and invasive interventions (Fig. 2-4).

3.1. Artificial insemination

3.1.1. Before artificial insemination

This treatment refers to the preparatory stage before artificial insemination.

3.1.1.1. Promotion of follicle growth. (1) Transcutaneous electrical acupoint stimulation

TEAS implementation begins on the fifth day of menstruation or withdrawal bleeding from hormone discontinuation (Fig. 2B). The core acupoints include Guanyuan (RN4), Zhongji (RN3), Tianshu (ST25), Zigong (EX-CA1), Sanyinjiao (SP6), Shenshu (BL23), Yaoyangguan (DU3), and Mingmen (DU4). The parameters of TEAS are as follows: for a continuous wave of 2 Hz, the intensity depends on the degree of physiological comfort. (Frequency: Once a day for 30 min each time until successful ovulation is monitored via transvaginal ultrasound. Duration: 3 menstrual cycles.)

(2) Moxibustion

Moxibustion implementation begins on the fifth day of menstruation or withdrawal of bleeding from hormone discontinuation (Fig. 3A).

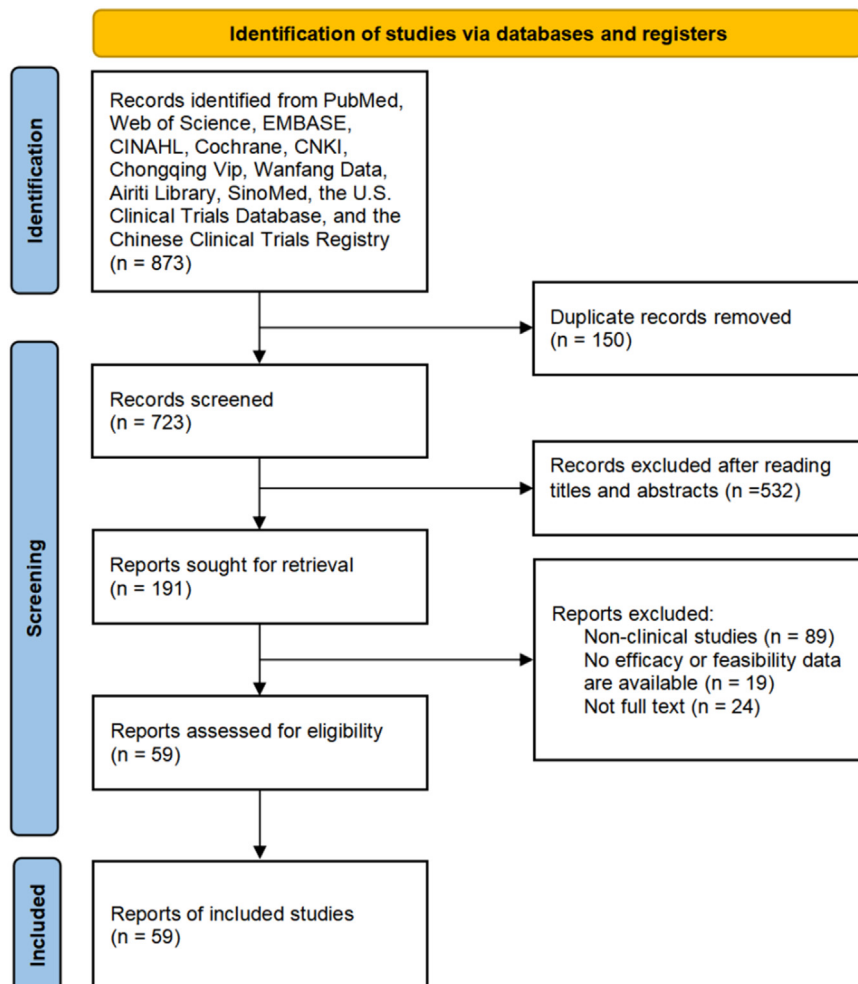


Fig. 1. Flow chart of studies for inclusion.

Table 2
Clinical practice recommendations (23 items).

Study	Type	Stage	Intervention	Acupoint	Frequency	Duration	
ART	Artificial insemination	Before	Promotion of follicle growth	TEAS	Guanyuan (RN4), Zhongji (RN3), Tianshu (ST25), Zigong (EX-CA1), Sanyinjiao (SP6), Shenshu (BL23), Yaoyangguan (DU3), Mingmen (DU4)	Once a day for 30 min each time until the successful ovulation is monitored by transvaginal ultrasound	Three menstrual cycles
				Moxibustion	Guanyuan (RN4), Zigong (EX-CA1)	Once a day for 30 min each time until the successful ovulation is monitored by transvaginal ultrasound	Three menstrual cycles
				Acupuncture	Guanyuan (RN4), Zigong (EX-CA1), Sanyinjiao (SP6), Zusanli (ST36)	Every other day for 30 min each time until the successful ovulation is monitored by transvaginal ultrasound	Three menstrual cycles
	IVF-ET	After	Pregnancy is confirmed	AA	Shenmen (TF4), Sympathetic nerve(AH6a), Kidney(CO10), Liver (CO12), Internal genitalia (TF2)	Three to five times per day, each acupoint is pressed for 1 min	Two weeks
		Before	Pituitary down-regulation	AA	Heart (CO15), Shenmen (TF4), Liver (CO12), Spleen (CO13), Kidney(CO10)	Three to five times per day, each acupoint is pressed for 1 min	Lasts until pituitary down-regulation status is reached
				TEAS	Guanyuan (RN4), Zigong (EX-CA1), Zhongji (RN3), Sanyinjiao (SP6), Taixi (KI3)	Once a day for 30 min each time until HCG day	Three menstrual cycles
			Ovulation induction	AA	Kidney (CO10), Spleen (CO13), Liver (CO12), Pelvis (TF5), Adrenal Gland (TG2p), Subcortex (AT4)	Three to five times per day, each acupoint is pressed for 1 min until HCG day	Three menstrual cycles
				Moxibustion	Shenque (RN8), Zhongwan (RN12), Guanyuan (RN4), Shenshu (BL23), Pishu (BL20), Zusanli (ST36), Sanyinjiao (SP6)	Two to three times per week for 5 to 10 min each time until HCG day	Three menstrual cycles
				Acupuncture	Group 1: Mingmen (DU4), Yaoyangguan (DU3), Shenshu (BL23), Ciliao (BL32). Group 2: Guanyuan (RN4), Qihai (RN6), Dahe(KL12), Zigong (EX-CA1), Zusanli (ST36), Sanyinjiao (SP6), Taixi (KI3), Taichong (LR3)	Every other day for 30 min each time until HCG day	Three menstrual cycles
			Improvement of endometrial receptivity	TEAS	Zigong (EX-CA1), Guilai (ST29), Xuehai (SP10), Dijii(SP8)	Once	30min
				Moxibustion	Shenque (RN8), Guanyuan (RN4), Zhongji (RN3), Zigong (EX-CA1), Guilai (ST29), Sanyinjiao (SP6)	Two to three times per week for 5 to 10 min each time until next menses or pregnancy	Three menstrual cycles
				Acupuncture	Group 1:Dazhui (DU14), Baihui (DU20), Xinshu(BL15), Geslu (BL17), Ganshu (BL18), Shenshu (BL23). Group 2: Zhongwan (RN12), Guanyuan (RN4), Zigong (EX-CA1), Zusanli (ST36), Sanyinjiao (SP6)	Two to three times per week for 30 min each time until next menses or pregnancy	Three menstrual cycles
		After	ET day to before pregnancy Pregnancy is confirmed	TEAS	Guanyuan (RN4), Zhongwan (RN12), Shenshu (BL23), Zusanli (ST36), Taixi (KI3)	Once	30min
				AA	Shenmen (TF4), Sympathetic nerve(AH6a), Kidney(CO10), Liver (CO12), Internal genitalia (TF2)	three to five times per day, each acupoint is pressed for 1 min	Two weeks

(continued on next page)

Table 2 (continued)

Study	Type	Stage	Intervention	Acupoint	Frequency	Duration	
	Complications	Physical	Postoperative pain after oocyte retrieval	TEAS	Hegu (LI4), Laogong (PC8), Neiguan (PC6), Waiguan (TE5)	Once	Until the end of the oocyte retrieval operation
				Auricular thumbtack needle	Internal genitalia (TF2), Pelvis (TF5), Shenmen (TF4), Endocrine (CO18)	Bilateral auricular acupoints are pressed for 30 s each time, three to five times per day	Three days
				Acupressure	Zigong (EX-CA1), Hegu(LI4), Zusanli (ST36), Sanyinjiao (SP6)	Once, each acupoint is pressed for 30s	15~20min
				Acupuncture	Baihui (DU20), Hegu (LI4), Zusanli (ST36), Sanyinjiao (SP6)	Once	30min
			OHSS	Acupuncture	Shuifen (RN9), Shuidao (ST28), Zigong (EX-CA1), Tianshu (ST25), Yinlingquan (SP9), Diji (SP8), Sanyinjiao (SP6), Zusanli (ST36)	Every other day	One week
		Mental	Emotional disorders	TEAS	Group 1:Xuehai (SP10), Diji(SP8), Taichong (LR3), Zusanli (ST36) Group 2:Guanyuan (RN4), Zhongwan (RN12), Zigong (EX-CA1), Neiguan (PC6)	Once	30min
				AA	Shenmen (TF4), Endocrine (CO18), Internal genitalia (TF2)	Three to five times per day, each acupoint is pressed for 1 min	One month
				Five elements music	/	Once a day for 15 min each time	One month
				Acupuncture	Baihui (DU20), Shenting (DU24), Shenmen (HT7), Daling (PC7), Neiguan (PC6), Zusanli (ST36), Sanyinjiao (SP6), Taichong (LR3)	Two to three times per week, for 30 min each time	One month

ART, assisted reproductive technology; AA, auricular acupressure; EA, electroacupuncture; HCG, human chorionic gonadotropin; IVF-ET, in vitro fertilization and embryo transfer; OHSS, ovarian hyperstimulation syndrome; TEAS, transcutaneous electrical acupoint stimulation.

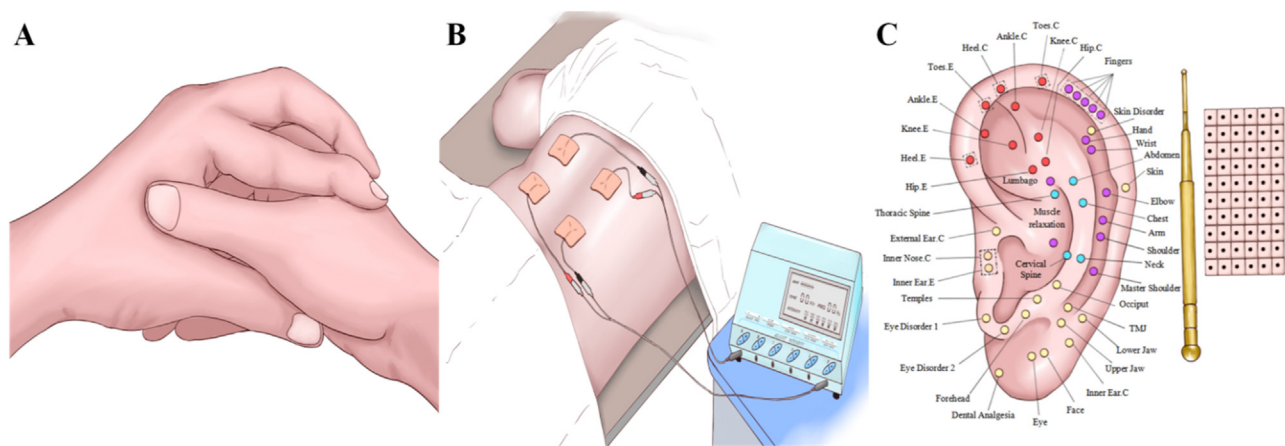


Fig. 2. Contact interventions.

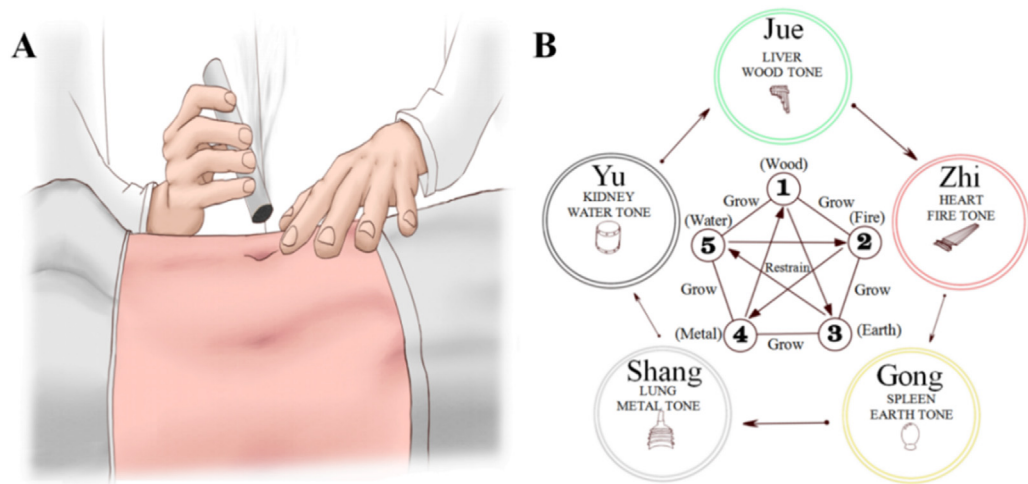


Fig. 3. Non-contact interventions.

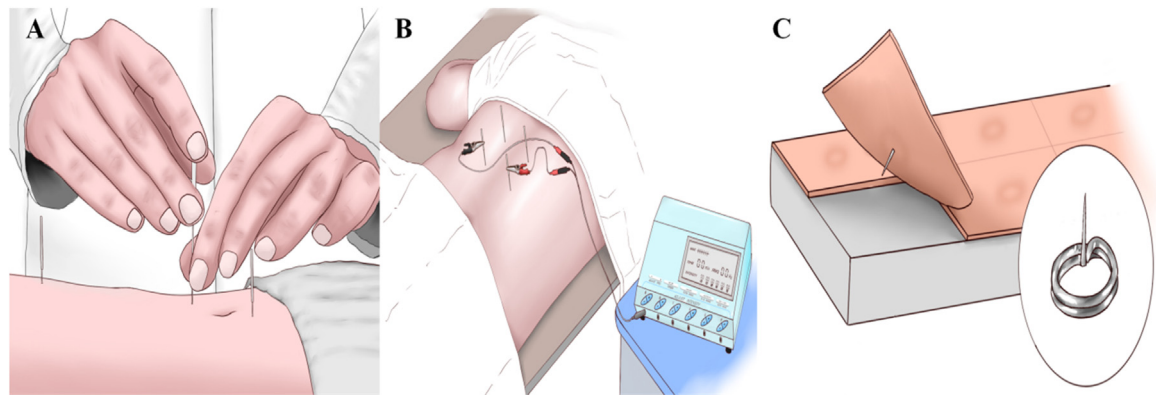


Fig. 4. Invasive interventions.

The core acupoints include Guanyuan (RN4) and Zigong (EX-CA1). (Frequency: Once a day for 30 min each time until successful ovulation is monitored via transvaginal ultrasound. Duration: 3 menstrual cycles.)

(3) Acupuncture (manual and electro)

Acupuncture implementation begins on the fifth day of menstruation or withdrawal from hormone discontinuation (Fig. 4A, 4B). The core acupoints include Guanyuan (RN4), Zigong (EX-CA1), Sanyinjiao (SP6), and Zusanli (ST36). Two to four acupoints can be chosen for electrical stimulation via electroacupuncture (EA). The parameters of EA are as follows: continuous wave frequency of 2 Hz and intensity depending

on the degree of physiological comfort. (Frequency: Every other day for 30 min until successful ovulation was monitored via transvaginal ultrasound. Duration: 3 menstrual cycles.)

3.1.2. After artificial insemination

This treatment refers to the stage during which pregnancy is confirmed after artificial insemination.

(1) Auricular acupressure

AA implementation begins on a clinically confirmed pregnancy (Fig. 2C). The core acupoints include Shenmen (TF4), sympathetic nerve

(AH6a), kidney (CO10), liver (CO12), and internal genitalia (TF2). (Frequency: Three to five times per day, each acupoint is pressed for 1 min, with the pressure ranging from light to heavy to make the acupoint warm, numb, swollen, and sore. One side of the auricular acupoint is chosen each time, and the vaccaria seeds on each side are kept for 3-5 days, alternating bilaterally. Duration: 2 weeks.)

3.2. *In vitro* fertilization and embryo transfer (IVF-ET)

3.2.1. Before IVF-ET

This treatment refers to the preparatory stage before IVF-ET.

3.2.1.1. Pituitary downregulation. (1) Auricular acupressure

AA implementation begins with pituitary downregulation. The core acupoints include the heart (CO15), Shenmen (TF4), liver (CO12), spleen (CO13), and kidney (CO10). (Frequency: 3-5 times per day, each acupoint is pressed for 1 min, with the pressure ranging from light to heavy to make the auricular point warm, numb, swollen, and sore. One side of the auricular acupoint is chosen each time, and the vaccaria seeds on each side are kept for 3-5 days, alternating bilaterally. Duration: Until pituitary downregulation status is reached.)

3.2.1.2. Ovulation induction. (1) Transcutaneous electrical acupoint stimulation

TEAS implementation begins on the first day of the administration of ovulation induction drugs. The core acupoints include Guanyuan (RN4), Zigong (EX-CA1), Zhongji (RN3), Sanyinjiao (SP6), and Taixi (KI3). The parameters of TEAS include a continuous wave of 2 Hz, the intensity of which depends on the degree of physiological comfort. (Frequency: Once a day for 30 min each time until the human chorionic gonadotropin (HCG) day. Duration: 3 menstrual cycles.)

(2) Auricular acupressure

AA implementation begins on the first day of the administration of ovulation induction drugs. The core acupoints include the kidney (CO10), spleen (CO13), liver (CO12), pelvis (TF5), adrenal gland (TG2p), and subcortex (AT4). (Frequency: 3-5 times per day, each acupoint is pressed for 1 min, with the pressure ranging from light to heavy to make the auricular point warm, numb, swollen, and sore. One side of the auricular acupoints is chosen each time, and the vaccaria seeds on each side are kept for 3-5 days, alternating bilaterally until the HCG day. Duration: 3 menstrual cycles.)

(3) Moxibustion

Moxibustion implementation begins on the first day of the administration of ovulation induction drugs. The core acupoints include Shenque (RN8), Zhongwan (RN12), Guanyuan (RN4), Shenshu (BL23), Pishu (BL20), Zusanli (ST36), and Sanyinjiao (SP6). (Frequency: 2-3 times per week for 5-10 min each time until the HCG day. Duration: 3 menstrual cycles.)

(4) Acupuncture (manual and electro)

Acupuncture implementation begins on the first day of the administration of ovulation induction drugs. There are two groups of core acupoints. Group 1: Mingmen (DU4), Yaoyangguan (DU3), Shenshu (BL23), and Ciliao (BL32). Group 2: Guanyuan (RN4), Qihai (RN6), Dahe (KL12), Zigong (EX-CA1), Zusanli (ST36), Sanyinjiao (SP6), Taixi (KI3), and Taichong (LR3). Two to four acupoints can be chosen for electrical stimulation via EA. The parameters of EA include a continuous wave of 2 Hz, the intensity of which depends on the degree of physiological comfort. (Frequency: Every other day for 30 min each time until the HCG day. Duration: 3 menstrual cycles.)

3.2.1.3. Improvement in endometrial receptivity. (1) Transcutaneous electrical acupoint stimulation

TEAS implementation begins 24 h before embryo transfer. The core acupoints include Zigong (EX-CA1), Guilai (ST29), Xuehai (SP10), and Diji (SP8). The parameters of TEAS include a continuous wave of 2 Hz,

the intensity of which depends on the degree of physiological comfort. (Frequency: Once. Duration: 30 min.)

(2) Moxibustion

Moxibustion implementation begins at the end of menstruation, or bleeding is withdrawn from hormone discontinuation. The core acupoints used include Shenque (RN8), Guanyuan (RN4), Zhongji (RN3), Zigong (EX-CA1), Guilai (ST29), and Sanyinjiao (SP6). (Frequency: 2-3 times per week for 5 to 10 min each time until the next menses or pregnancy. Duration: 3 menstrual cycles.)

(3) Acupuncture (manual and electro)

Acupuncture implementation begins at the end of menstruation, or bleeding is withdrawn from hormone discontinuation. There are two groups of core acupoints. Group 1: Dazhui (DU14), Baihui (DU20), Xinsu (BL15), Geshu (BL17), Ganshu (BL18), and Shenshu (BL23). Group 2: Zhongwan (RN12), Guanyuan (RN4), Zigong (EX-CA1), Zusanli (ST36), and Sanyinjiao (SP6). Two to four acupoints can be chosen for electrical stimulation via EA. The parameters of EA include a continuous wave of 2 Hz, the intensity of which depends on the degree of physiological comfort. (Frequency: 2-3 times per week for 30 min each time until the next menses or pregnancy. Duration: 3 menstrual cycles.)

3.2.2. Embryo transfer (ET)

The following treatment refers to the stage from the day of ET to the day before pregnancy is confirmed.

(1) Transcutaneous electrical acupoint stimulation

TEAS implementation begins 30 min after embryo transfer. The core acupoints include Guanyuan (RN4), Zhongwan (RN12), Shenshu (BL23), Zusanli (ST36), and Taixi (KI3). The parameters of TEAS include a continuous wave of 2 Hz, the intensity of which depends on the degree of physiological comfort. (Frequency: Once. Duration: 30 min.)

3.2.3. Pregnancy

The following treatment refers to the stage when pregnancy is confirmed after IVF-ET.

(1) Auricular acupressure implementation

The treatment step was the same as that described above in [Section 3.1.2](#).

3.3. Prevention and treatment of art and its complications

3.3.1. Postoperative pain after oocyte retrieval

(1) Transcutaneous electrical acupoint stimulation

TEAS implementation begins 30 min before the oocyte retrieval operation. The core acupoints include Hegu (LI4), Laogong (PC8), Neiguan (PC6), and Waiguan (TE5). The parameters of TEAS include sparse and dense waves of 2/100 Hz, the intensity of which depends on the degree of physiological comfort. (Frequency: Once. Duration: Until the end of the operation.)

(2) Auricular thumbtack needle

Auricular thumbtack needle begins 30 min before the oocyte retrieval operation ([Fig. 4C](#)). The core acupoints include the internal genitalia (TF2), pelvis (TF5), Shenmen (TF4), and endocrine (CO18) acupoints. (Frequency: Bilateral auricular acupoints are pressed for 30 sec each time, 3-5 times per day. Duration: 3 days.)

(3) Acupressure

Acupressure was initiated 30 min before the oocyte retrieval operation ([Fig. 2A](#)). The core acupoints include Zigong (EX-CA1), Hegu (LI4), Zusanli (ST36), and Sanyinjiao (SP6). (Frequency: Once, each acupoint is pressed for 30 sec. Duration: 1520 min.)

(4) Acupuncture (manual and electro)

Acupuncture implementation begins 30 min before the oocyte retrieval operation. The core acupoints include Baihui (DU20), Hegu (LI4), Zusanli (ST36), and Sanyinjiao (SP6), and two to four acupoints can be chosen for electrical stimulation via EA. The parameters of EA include a continuous wave of 2 Hz, the intensity of which depends on the degree of physiological comfort. (Frequency: Once. Duration: 30 min.)

3.3.2. Ovarian hyperstimulation syndrome (OHSS)

(1) Acupuncture (manual and electro)

The core acupoints include Shuifen (RN9), Shuidao (ST28), Zigong (EX-CA1), Tianshu (ST25), Yinlingquan (SP9), Diji (SP8), Sanyinjiao (SP6), and Zusanli (ST36). Two to four acupoints can be chosen for electrical stimulation via EA. The parameters of EA include a continuous wave of 2 Hz, the intensity of which depends on the degree of physiological comfort. (Frequency: Every other day. Duration: 1 week.)

3.3.3. Emotional disorders

(1) Transcutaneous electrical acupoint stimulation

TEAS implementation begins 24 h before the oocyte retrieval operation. The core acupoints include Xuehai (SP10), Diji (SP8), Taichong (LR3), and Zusanli (ST36). The parameters of TEAS include sparse and dense waves of 2/100 Hz, the intensity of which depends on the degree of physiological comfort. (Frequency: Once. Duration: 30 min.)

TEAS implementation begins 2 h before the oocyte retrieval operation. The core acupoints include Guanyuan (RN4), Zhongwan (RN12), Zigong (EX-CA1), and Neiguan (PC6). The parameters of TEAS include sparse and dense waves of 2/100 Hz, the intensity of which depends on the degree of physiological comfort. (Frequency: Once. Duration: 30 min.)

(2) Auricular acupressure

The core acupoints include Shenmen (TF4), endocrine (CO18), and internal genitalia (TF2). (Frequency: Each acupoint is pressed three to five times per day for 1 min, with the pressure ranging from light to heavy to make the auricular point warm, numb, swollen and sore. One side of the auricular acupoint is chosen each time, and the vaccaria seeds on each side are kept for three to five days, alternating bilaterally. Duration: One month.)

(3) Five-element music

Five-element music is based on the 5 tones (Jue, Zhi, Gong, Yu, Shang) of traditional Chinese music (Fig. 3B). To cure feelings of depression, Jue music is beneficial for soothing the liver and relieving depression. The recommended repertoires include “Sihe Ruyi” and “Eighteen Songs of a Nomad Flute”. To cure feelings of anxiety, Yu music is beneficial for clearing heart fire. The recommended repertoires include “Wild geese on the beach” and “Three Stanzas of Plum-blossoms”. The participants wore binaural headphones and listened at a suitable volume. (Frequency: Once a day for 15 min each time. Duration: One month.)

(4) Acupuncture (manual only)

The core acupoints include Baihui (DU20), Shenting (DU24), Shenmen (HT7), Daling (PC7), Neiguan (PC6), Zusanli (ST36), Sanyinjiao (SP6), and Taichong (LR3). (Frequency: Two to three times per week for 30 min each time. Duration: One month.)

4. Discussion

Infertility has become a significant public health concern.²⁹ There is a growing demand for ART in response to increasing infertility rates.³⁰ Even though a remarkable improvement in ART has been accomplished over the past few decades, several infertile women still experience recurrent ART failure,^{31–32} which has become an important issue in ART.³³ The unpredictable results of ART may put patients and their families under great pressure, which severely affects their physical and mental health and has a negative impact on both individuals and society.³⁴ Furthermore, ART is associated with postoperative pain after oocyte retrieval, the risk of OHSS and emotional disorders,^{35–38} and complications, which are of great concern following ART.

TCM has a long history in treating infertility. A growing body of evidence has shown that non-pharmacological TCM interventions play a unique role in the ART treatment cycle. In the present study, some evidence suggests that acupuncture significantly improves the clinical pregnancy rate and live birth rate among women undergoing IVF.¹⁸ EA and TEAS are effective in treating infertility, as they relieve pain during oocyte retrieval, reduce the occurrence of OHSS, and improve

the pregnancy rate after ET.^{17,19–20,39–40} Other studies have reported that TEAS and AA could help reduce anxiety levels associated with IVF and improve the outcomes of IVF.^{14–16} All the studies mentioned above have revealed that non-pharmacological interventions involving TCM are widely used as an adjunct to ART, which may improve the rate of pregnancy.

However, no standard treatment guidelines or consensus are currently available regarding non-pharmacological interventions of TCM for patients undergoing ART. Based on this, our experts agreed that it is necessary to propose a consensus on this issue.

After careful multidisciplinary discussion, the experts commonly agreed on the key issues related to non-pharmacological interventions of TCM. The consensus provides 8 non-pharmacological interventions, including transcutaneous electrical acupoint stimulation, moxibustion, manual acupuncture, electroacupuncture, auricular acupressure, auricular thumbtack needle, acupressure and five-element music. There are two main types of ART, artificial insemination and IVF-ET, and in this context, these two main types are divided into seven different stages with the goal of increasing the pregnancy rate. Artificial insemination involves promoting follicle growth, improving sperm quality, and preventing miscarriage after artificial insemination. IVF-ET involves pituitary downregulation, ovulation induction, improvement of endometrial receptivity, ET, and miscarriage prevention after IVF-ET. Moreover, a treatment regimen is recommended for preventing and treating the underlying symptoms and complications associated with ART. The major complications are threefold: postoperative pain after oocyte retrieval, OHSS, and emotional disorders. Non-pharmacological TCM interventions are also administered to treat pain during oocyte retrieval, OHSS, and emotional disorders, and we should pay more attention to prevention.

This consensus focuses on the whole cycle of ART, including treatment from the preparation stage to the postpregnancy stage; this is because prevention is one of the most important essences of TCM, which indicates preventing a disease before it arises. Therefore, non-pharmacological TCM interventions should be started early in the preparatory stage before ART, with the aim of promoting follicle development and improving oocyte quality and endometrial receptivity to create more opportunities for embryo implantation and pregnancy. At the same time, the consensus is also concerned with the underlying symptoms and complications associated with ART, not only for physical disorders but also for psychological disorders. Psychological issues may be prone to occur during ART, and patients with anxiety and stress while receiving ART may have a lower pregnancy rate.^{41–42} This regimen offers non-pharmacological TCM interventions to regulate emotions throughout the ART cycle, and we believe that prevention is more important than a cure.

In summary, non-pharmacological interventions of TCM might serve as adjuvant therapies to improve pregnancy outcomes during the ART cycle. In line with the consensus developed by our multidisciplinary group, in the future, the regimen should be more pragmatic, allowing a greater number of treatments to be administered over a longer period of time, and individual differences should always be taken into consideration when determining treatment options.

4.1. Strengths and limitations

The strength of this consensus is that it is the first consensus to summarize novel non-pharmacological interventions involving TCM during the ART cycle. This consensus establishes an optimal, consistent clinical regimen, which is achieved by experienced experts from this area of clinical practice, and active researchers have contributed to providing high-quality, dependable evidence for non-pharmacological TCM interventions during ART. This consensus could provide clinical perspectives on the non-pharmacological interventions of TCM during the key steps of ART treatment and may supplement clinical guidelines that help to further improve treatment outcomes.

There are several limitations to the consensus as well. First, the consensus is not a comprehensive list of opinions, which represent only the collective opinion of some experts in China and do not include all provinces of the country. Second, owing to the disadvantage of the literature with respect to insufficient sample size, single-center research and deviations in the evaluation of curative effects, the recommended regimens could not meet the GRADE guidelines for high-quality evidence. Third, the regimen merely includes non-pharmacological interventions of TCM, and in the future the regimen should provide more treatment options for clinical practice.

4.2. Conclusion

The consensus provides 8 non-pharmacological interventions for seven different stages of the ART cycle and three major complications during ART, involving 23 items of clinical practice recommendations, which may be evolved over time by incorporating large-scale, multicenter, and high-quality clinical studies.

CRediT authorship contribution statement

Xinyue Li: Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing. **Hye Won Lee:** Methodology, Formal analysis, Writing – review & editing. **Tianyi Zhou:** Methodology, Formal analysis, Writing – review & editing. **Nicola Robinson:** Writing – review & editing. **Xiao-Yang Miao Hu:** Writing – review & editing. **Momir Dunjić:** Writing – review & editing. **Fangfang Wang:** Methodology, Writing – review & editing. **Rong Zhang:** Writing – review & editing. **Consensus Panel:** Writing – review & editing. **Yuhang Zhu:** Writing – review & editing. **Fan Qu:** Methodology, Writing – original draft, Writing – review & editing, Supervision.

Declaration of competing interests

The author(s) report no conflicts of interest in this work.

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Ethical statement

This study did not involve any ethical issues.

Data availability

The data are available from the corresponding author upon reasonable request.

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