

# Acupuncture for the Mental and Emotional Health of Women Undergoing IVF Treatment: A Comprehensive Review

**Lori-Ellen Grant\*** MHS (Traditional Chinese Medicine)

**Suzanne Cochrane** PhD

School of Science and Health, University of Western Sydney, Australia

## ABSTRACT

One in six Australian couples currently struggle with impaired fertility. In vitro fertilisation (IVF) has become the assisted reproductive technology (ART) of choice. The IVF process has inherent stresses: the invasive procedures; medication; knowledge that it might be the last possibility for pregnancy; and the high cost. Both authors have observed in different settings (one clinical and the other during a clinical trial) that women often reported an improved sense of wellbeing and emotional health due to the acupuncture intervention. This paper summarises the reported benefits of acupuncture treatment for mental and emotional health during IVF identified in published peer-reviewed research papers – both theoretically (pathogenesis and physiology) and clinically (with reference to acupuncture treatment and the therapeutic encounter). The trials reviewed, investigating mental and emotional health during IVF treatment, indicate acupuncture had positive outcomes including: reduced anxiety; reduced stress; less social and relationship concern and improved psychological coping. This paper suggests that reflecting on and valuing the therapeutic alliance, including its collaborative nature, the patient feeling cared for and a perception that practitioners are empathetic, could improve fertility outcomes and the emotional health of infertile women through the process of IVF treatment.

**KEYWORDS** acupuncture, traditional Chinese medicine, in vitro fertilisation, IVF, fertility, stress, anxiety

### In Vitro Fertilisation (IVF)

IVF is one form of Assisted Reproductive Technology (ART) and estimates show that 3.6% of women in Australia who gave birth received some form of ART treatment. With just over 60 000 ART treatment cycles, there was a clinical pregnancy rate of 23.9% and a live delivery rate of 18.1%.<sup>1</sup>

One in six Australian couples 'are currently struggling with impaired fertility'.<sup>2</sup> Infertility as defined by the World Health Organization (WHO) is the 'failure to conceive after twelve months of unprotected intercourse'.<sup>3</sup> The causes of infertility

in Australia and New Zealand as documented by the Australian government<sup>1</sup> in 2010 are: 'Of the 60 687 initiated autologous and recipient cycles, 21.7% reported male infertility factors as the only cause of infertility; 38.6% reported only female infertility factors; 13.8% reported combined male–female factors; 25.2% reported unexplained infertility; and 0.7% were not stated.' Marriage and childbirth occurring later in life is a main social cause of infertility.<sup>4</sup> The prognosis of ART outcomes are affected by maternal age and the type of infertility experienced.<sup>4,5</sup>

\* Correspondent author; e-mail: loriellen@wholebody.co.nz

For the women undergoing treatment, the nature of IVF, the invasive procedures, medication, knowledge that it is often the last possibility and the high cost, all lead to a degree of mental and emotional ill-health.<sup>6</sup> Biomedical research shows pregnancy outcomes were reduced and miscarriage increased in women who worried about financial or medical concerns;<sup>7</sup> had high levels of distress (Hjollund et al.),<sup>11</sup> depression or anxiety during their IVF cycle<sup>8</sup> and had a history of depression earlier in life (Lapane et al.).<sup>11</sup> Greater than average fertility rates were predicted with low psychosomatic symptoms.<sup>9</sup>

Infertile women undergoing IVF who also entered a behavioural study reported similar psychological stress to people with cancer.<sup>10</sup> Two pathways, the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic-adrenal-medulla (SAM) axis, are described as mediating the effects of psychological factors (stress, depression) on the reproductive system. This could affect gonadotropins in synthesising sex steroids and oxytocin (Cwikel).<sup>11</sup> Changes in heart rate and cortisol caused by stress, anxiety and depression is considered predictive of a decreased probability of achieving a viable pregnancy<sup>12</sup> and research has shown that stress, anxiety, and depression all contribute to a lower pregnancy rate among women undergoing IVF.<sup>8,11-13</sup> Whether the cycle was the first treatment or a subsequent cycle also has a significant difference in the depressive symptoms reported, with 15% of women in the first cycle and 25% in subsequent cycles reporting feeling depressed.<sup>10</sup> A vicious cycle of 'social stigmatization, decreased self-esteem, unmet reproductive potential of sexual relationship, physical and mental burden of treatment, lack of control on the treatment outcome' are identified by Chang et al. as factors leading to psychological stress, which in turn could influence the ability to conceive.<sup>14,15</sup> Furthermore, adverse effects associated with IVF medications could contribute to the mental and emotional status of women undergoing IVF. Those adverse effects include hot flushes, abdominal pain and distention, headaches, emotional lability, insomnia, nausea, dizziness and induction of a menopause state.<sup>16</sup>

There is a relatively low uptake for psychological counselling services of between 5–15% of couples undergoing fertility treatment<sup>17</sup> even though counselling is often recommended for all causes of infertility.<sup>18</sup> Women with a lack of social support and those appraised as having high levels of helplessness dealing with infertility had an increased risk factor of developing emotional problems.<sup>19</sup> Women who worried about financial concerns or medication interventions had worse pregnancy outcomes and those who were very concerned about cost were more likely to miscarry.<sup>7</sup> The emotional stress of IVF also increased the rate of absence from work with women considering the emotional impact to be 'more strenuous' than the physical impact.<sup>19</sup>

Women may not recognise the importance of 'emotional support' during IVF treatment. Patients have reported that they were not adequately informed about medical procedures as well as psychological needs during IVF<sup>20</sup> and that support from family and friends was low due to inadequate information about what IVF entails.<sup>21</sup>

## Acupuncture

In Australia complementary and alternative medicine (CAM) is used by 52–69% of the population.<sup>22</sup> Users, as identified by Australian and international literature are 'more likely to be women, well-educated, employed on higher than average wages and with private health insurance'.<sup>4</sup> A study of focus groups of infertile women in Melbourne found the key themes in the use of CAM was 'a woman's strong desire for motherhood; women's negative experiences of ART; and women's positive experience of CAM practitioners'.<sup>4</sup> CAM practitioners reported that their fertility practice was predominantly with women also using ART.<sup>4</sup>

The intention behind acupuncture during IVF thus far has been to improve pregnancy and live birth rates and this has been mostly studied at the time of embryo transfer (ET) and as an anaesthetic during oocyte retrieval. Five recent systematic reviews are not in agreement regarding acupuncture as an adjunct treatment to increase pregnancy rates during IVF treatment. Two reviews found insufficient evidence,<sup>13,23</sup> two reviewed cautiously and found limited but supportive evidence to suggest that acupuncture improved IVF success rates,<sup>6,12</sup> and one found that acupuncture improved rates of pregnancy and live birth rates during IVF treatment at the time of embryo transfer.<sup>24</sup> Only one review mentioned mental and emotional health as possibly contributing to the positive effect acupuncture had on the IVF outcome.<sup>6</sup> Previous research found that acupuncture induced a series of physiological changes which may contribute to reduction in stress and anxiety. Evidence indicates that the calming effect of acupuncture involves inhibition on the sympathetic nervous system, enhanced the release of  $\beta$ -endorphin, serotonin and dopamine.<sup>33</sup>

- Acupuncture could improve fertility outcomes by increasing uterine blood flow, affecting neuroendocrinological factors and by reducing stress, anxiety and depression.<sup>14,34,35</sup>
- Acupuncture is also thought to demonstrate effects on the HPA axis.<sup>33,35,36</sup>
- Acupuncture influenced cortisol and prolactin levels which could lead to increased rates of pregnancy.<sup>37</sup>

This current comprehensive review aims to explore the effect of acupuncture on mental and emotional health (stress, anxiety and depression) for women undergoing IVF.

## Search Strategy

To find all available evidence on the link between IVF treatment and mental and emotional health, an electronic database search was conducted in October 2012 and June 2013 in the following databases: CINAHL, Cochrane library, Medline, PubMed, ScienceDirect, and Google Scholar. Information was obtained from clinical guidelines, including Best Practice and National Health and Medical Research Council (NHMRC). Individual Chinese medicine journals were also searched. The search terms used were: acupuncture, in vitro fertilisation, IVF, embryo transfer, transplantation, assisted reproductive technology, ART, embryo, pregnancy, stress, depression, anxiety and emotion. The inclusion criteria were trials published in English, acupuncture trials of infertile women involving the IVF process, with outcome measures of stress, anxiety or depression and with no limit to the date of publication. Exclusion criteria were all trials not in English, trials about other ART or stages of fertility treatment, and trials about male- or couple-related mental and emotional health.

Sixty-six records were found, including 11 systematic reviews, 17 randomised controlled trials, one case series, 28 qualitative studies and nine opinion papers. Of these, six trials were identified to meet the inclusion criteria.

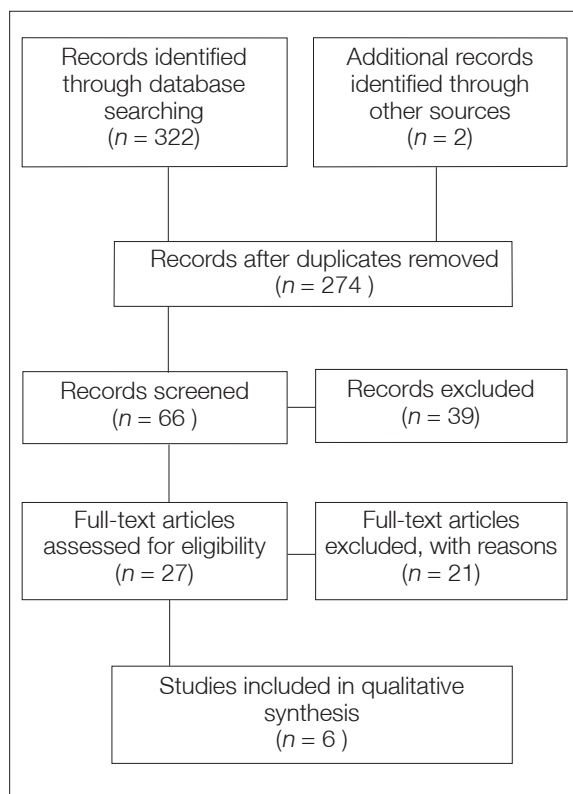


FIGURE 1 PRISMA flow chart

## Acupuncture Literature Review Results

For the purpose of this paper, acupuncture as one pillar of traditional Chinese medicine is reviewed. The findings are explained firstly via pathogenesis and physiology and secondly in regards to women and mental and emotional health outcomes.

When reviewing acupuncture trials involving women and mental and emotional health outcomes, five studies reported improvements<sup>25-29</sup> and one did not report any benefit.<sup>30</sup> In the trials there were different outcome measures, acupuncture protocols, controls and treatment that occurred at different times. Refer to Table 1 for trial details.

Acupuncture was found to reduce anxiety symptoms as recorded with the Hamilton Anxiety Rating Scale (HAS) in women ( $n = 43$ ) undergoing IVF treatment, yet there was no difference in the pregnancy rates between the groups.<sup>25</sup> Sham acupuncture was used as the control. In a small study ( $n = 13$ ) including women that were undergoing ART or natural fertility and receiving acupuncture treatment, the response suggested that acupuncture may improve self-efficacy and psychological coping for women experiencing delays falling pregnant.<sup>29</sup> Women undergoing IVF or IVF/IUI ( $n = 57$ ) received acupuncture pre-ET and post-ET reported lower perceived stress scores than those who did not receive acupuncture.<sup>27</sup> The pregnancy rate in the acupuncture group was 64.7% versus 42.5% in the non-acupuncture group. The authors concluded that acupuncture lowered perceived stress at the time of embryo transfer and possibly improved the pregnancy rate. In an acupuncture trial ( $n = 32$ ) with infertile women who had all had IVF, with some planning more IVF treatment, the outcomes aimed to address self-efficacy, anxiety and infertility-related stress administering treatment over eight weeks compared to a waitlist control.<sup>28</sup> Significant changes were noticed regarding less 'social concern' and 'relationship concern' with a trend toward stress reduction on other infertility related domains. There was no comparison to pregnancy rates, yet four women became pregnant during the trial. Correlation was made between the hormones prolactin and cortisol, and their regulation by acupuncture during gonadotropins stimulation in the IVF treatment cycle.<sup>26</sup> They observed the acupuncture group as 'less stressed' and the maintenance of prolactin levels could 'produce better reproductive outcomes'.

So, Ng, Yeuk, Yeung, and Chung<sup>35</sup> investigated the effect of acupuncture after embryo transfer only on anxiety levels and found no difference in anxiety or pregnancy rates in the acupuncture or placebo acupuncture group.

In the reviewed trials, the acupuncture frameworks used were described as Five-element and traditional Chinese medicine

TABLE 1 Characteristics of included studies

Study & Design	Participants	Acupuncture Treatment and Practitioner	Acupuncture Points Used
Isoyama, 2012 Prospective Randomised Controlled Trial	43	4 weekly sessions throughout the IVF treatment; Professional acupuncturist	<i>n</i> = 22 HT7 <i>Shenmen</i> , PC6 <i>Neiguan</i> , CV17 <i>Shanzhong</i> , GV20 <i>Baihui</i> , <i>Yintang</i>
Kovarova, 2010 Prospective observational uncontrolled study design	17	Individualised treatment based on differential diagnosis and treatment protocols outlines by Lyttleton; Qualified acupuncturists trained in TCM; IVF or natural cycle	Example: Kidney chest points, <i>Yintang</i> , HT7 <i>Shenmen</i> , HT5 <i>Tongli</i> , PC6 <i>Neiguan</i> . Minimum of 4 treatments
Balk, 2010 Pilot study Observational prospective cohort study	57	Paulus Protocol used IVF; Physician acupuncturist	<i>n</i> = 20
Margarelli, 2008 Prospective cohort clinical study	67	Infertile undergoing IVF. Modified protocols of Paulus and Stener-Victorin = "Cridennda/Magarelli protocol". Nine electrostimulation acupuncture treatments before egg retrieval and one pre and post ET, 11 treatments in total; Certified and licensed acupuncturists were used	IVF with acupuncture
Smith, 2011 Pilot Randomised Controlled Trial	32	Six sessions of acupuncture over 8 weeks; IVF history in all subjects. Some planning IVF; Licensed acupuncturist with 14 years experience	Five-element (causative factor) and TCM style (syndrome pattern). Individualised protocol. Common points: Kidney chest points, PC6 <i>Neiguan</i> , PC5 <i>Jianshi</i> , HT5 <i>Tongli</i> , HT7 <i>Shenmen</i>
So, 2010 Randomised Controlled Trial Frozen-thawed embryo transfer	226	Patients were diagnosed using the four observations into related syndromes including: Kidney yang/yin deficiency, Liver qi stagnation with blood stasis, Spleen qi deficiency with phlegm and combination of those syndromes; Registered traditional Chinese medicine practitioner	A single session of acupuncture for 25 min immediately after the ET ST36 <i>Zusanli</i> , SP6 <i>Sanyinjiao</i> , SP10 <i>Xuehai</i> , LI4 <i>Hegu</i>

TABLE 1 Characteristics of included studies, cont.

Study & Design	Control Method	Outcomes	Results of Study
Isoyama, 2012 Prospective Randomised Controlled Trial	<i>n</i> = 21 Needles inserted into areas near yet not corresponding to acupuncture points	Hamilton Anxiety Rating Scale	Mean HAS score was significantly lower in the test group than the control ( <i>p</i> = 0.0008)
Kovarova, 2010 Prospective observational uncontrolled study design	No control used	Infertility self-efficacy (ISE) scale	Significant increase in total ISE scores from baseline and after four acupuncture treatments ( <i>p</i> = 0.008) <i>n</i> = 13 (completed both questionnaires)
Balk, 2010 Pilot study Observational prospective cohort study	<i>n</i> = 37 Completed perceived stress scale and rested for 25 min	Perceived stress level scores Pregnancy rates	Acupuncture 64.7% Without 42.5% Lower stress scores both pre-ET and post-ET than those without. Decreased stress correlated with increased pregnancy rates
Margarelli, 2008 Prospective cohort clinical study	IVF without acupuncture	Testing serum CORT (cortisol) and serum PRL (prolactin)	Beneficial regulation of CORT and PRL during the medication phase (gonadotropin stimulation) of the IVF treatment
Smith, 2011 Pilot Randomised Controlled Trial	Waitlist. Did not receive acupuncture during the trial. Offered it afterwards.	The primary outcomes were infertility self-efficacy, anxiety, and infertility-related stress	Less social concern (mean difference [MD] -3.75, 95% confidence interval [CI] -7.58 to 0.84, <i>p</i> = 0.05), and less relationship concern (MD -3.66, 95% CI -6.80 to -0.052, <i>p</i> = 0.02). There were also trends toward a reduction of infertility stress on other domains, and a trend toward improved self-efficacy (MD 11.9, 95% CI -2.20 to 26.0, <i>p</i> = 0.09) and less anxiety (MD -2.54, 95% CI -5.95 to 0.86, <i>p</i> = 0.08) in the acupuncture group compared with the waitlist control.
So, 2010 Randomised Controlled Trial Frozen-thawed embryo transfer	A single session of placebo acupuncture for 25 min immediately after the ET using the Streitberger's control. The same acupoints and procedure was used	Pregnancy and live birth rates Anxiety evaluated using the State-Trait Anxiety Questionnaire before and after the acupuncture treatment	No significant difference found between the groups

syndrome pattern,<sup>33,34</sup> traditional acupuncture,<sup>25</sup> traditional Chinese medicine using four observations,<sup>35</sup> and according to the principles of TCM.<sup>32</sup> Two trials used individualised treatment,<sup>33,34</sup> three used point prescriptions<sup>27,32,35</sup> with one of those trials<sup>35</sup> individually diagnosing while still using a point prescription.

Some of the common points used in the trials included HT7 *Shenmen*, PC6 *Neiguan*, CV17 *Shanzhong*, MHN3 *Yintang*, GV20 *Baihui*<sup>27,32-34</sup> which calm the spirit and regulate and tonify the heart.<sup>31</sup> When Ioyama et al.<sup>27</sup> used these points anxiety reduced, yet pregnancy was the same in both groups. Balk used the Paulus protocol<sup>32</sup> before and after the embryo transfer and also reported on perceived stress finding that stress reduced and pregnancy may be improved (the pregnancy results were not statistically significant with  $p = 0.13$ ). The Paulus protocol includes PC6 *Neiguan*, GV20 *Baihui* and the *Shenmen* ear point, all of which could affect mental and emotional wellbeing.

## Discussion

The six acupuncture trials that met the inclusion criteria have a degree of heterogeneity yet indicate predominantly positive outcomes for mental and emotional wellbeing of the women participants. They were randomised controlled trials which included a total of 442 women and the results were reported in peer-reviewed journals. Limitations, however, exist in relation to the small number of trials, the small number of participants, the control variation from study to study, and differing acupuncture treatment protocols. Acupuncture, for example, was performed at different times in the IVF cycle and there were a variety of outcome measures not consistently interpreted across the studies. The one trial that reported no significant difference in the groups involved a frozen-thawed embryo transfer, administered an acupuncture protocol only once after the ET and used a Streitberger control.<sup>27</sup> The use of a placebo, sham or Streitberger control has been questioned regarding whether it is an inert control or not.<sup>30,32,33</sup>

When addressing mental and emotional health for IVF women, the emphasis of acupuncture treatment is above and beyond the pregnancy or live birth outcome. The intention is to assist women to remain balanced at all times and provide therapeutic support to increase resilience to the inevitable stresses of the process of IVF. It has been reported that women may not recognise the importance of emotional support during IVF treatment.<sup>20</sup> Acupuncture, based on Chinese medicine theory, is a complex whole system encompassing physical, mental, and emotional elements of health.<sup>34,35</sup> Cochrane, Smith, and Possamai-Inesedy<sup>36</sup> have collated information regarding the best approach for fertility treatment from experienced practitioners. The consultation with ten experienced practitioners found

all placed high value on the importance of the practitioner-patient relationship for the therapeutic outcome. Bovey, Lorenc and Robinson<sup>5</sup> interviewed practitioners regarding their IVF perceptions and they felt that the benefits of treatment included stress reduction, relaxation and emotional support. When the author of this paper (LG) visited her local fertility clinic (Fertility Associates, Christchurch, NZ), she found from consulting with fifteen of the IVF team members (nurses, counsellors and doctors) that the resounding association with acupuncture was its 'relaxing' ability. Nurses verbalised that women who had been for acupuncture were more relaxed during their IVF treatment.

Women dealing with fertility challenges have stated that CAM practitioners gave them a positive experience which was different to their biomedical experience.<sup>4</sup> De Lacey and Smith describe acupuncture treatment as empowering women through taking a more 'active' role in their fertility.<sup>37</sup> The value in the therapeutic alliance has been described to include its collaborative nature, the patient feeling cared for and a perception that practitioners are empathetic.<sup>38</sup> A major strength of acupuncture treatment is its ability to individually diagnose patients. Within the six trials found, two used individualised methods<sup>33,34</sup> and four used standardised approaches. All trials used qualified acupuncturists, with one using a 'physician acupuncturist'.<sup>32</sup> It is important to consider that not all practitioners are equal; nor will they provide the same therapeutic encounter.<sup>39</sup> Differing effectiveness has been reported even when applying a standardised intervention.<sup>43</sup> Practitioners have been found to make decisions regarding diagnosis and treatment based on their training and personal preference as well as the individual case.<sup>40</sup>

Acupuncture has a variety of theoretical frameworks. It is possible that five element constitutional acupuncture treatment, with its psycho-emotional focus integrated with TCM theory, could be beneficial as a method in fertility treatment.<sup>28,41</sup> The integration of the two styles is described as 'effective for the treatment of physical illnesses and also enables practitioners to practise a person-centred style of acupuncture, which holds that the health of the spirit is essential to a person's well-being'.<sup>33</sup>

IVF treatment happens over time with different stages, from making the decision to getting the result. It is feasible to consider acupuncture has a role in the management of mental and emotional health throughout IVF. Currently there is a clinical pregnancy rate of 23.9% and a live delivery rate of 18.1%,<sup>42</sup> meaning that initially 76.1% of women are not pregnant, and during pregnancy, a further 5.8% will miscarry. Kowalcek, Kasimzade and Huber<sup>43</sup> found that 57% of women thought that they would be successful when asked about their expectations. Marcus, Marcus, Johnson and Marcus<sup>44</sup> found in a survey of reasons people stop IVF treatment that 35%



cited emotional reasons. This is supported by Verhaak et al.<sup>45</sup> documenting that when treatment is not successful, negative emotions in women increase. Clinically, experience shows that treatment is more effective over time. This might be explained by consistent improvements in reproductive outcomes of women treated with the Cridennda/Magarelli protocol of 11 acupuncture treatments – nine before hCG is used to induce the maturation of eggs and pre/post embryo transfer.<sup>26</sup>

## Conclusion

This comprehensive review indicates that the benefits of the acupuncture intervention during IVF treatment are: reduced anxiety; reduced stress; less social and relationship concern and improved psychological coping. These benefits encourage practitioners to consider addressing mental and emotional health as a part of their fertility practices. If this were the case, this could lead to clinical changes in treatment plans and in the choice of points used. Acupuncture may provide women an experience of support and a framework to help cope and develop resilience to manage the terrain of IVF treatment and the inevitable mental and emotional distress that occurs. It is possible that pregnancy and live birth outcomes may improve as a result.

## Clinical Commentary

The positive mental and emotional impacts of a course of acupuncture are apparent to clinicians. Every day people emerge more relaxed from an acupuncture session. Women undertaking ART therapies to assist their fertility report the experience as stressful in itself and a burden above and beyond their emotional response to fertility challenges. This article explores the evidence that connects using acupuncture to better manage the ART/IVF process and whether it is acupuncture's effect on mental and emotional health which impacts on fertility outcomes.

## References

1. Assisted Reproductive Technology in Australia and New Zealand 2010. Australia: Australian Government; Australian Institute of Health and Welfare; 2010.
2. Alfred A, Ried K. Traditional Chinese Medicine: Women's experiences in the treatment of infertility. *Aust Fam Physician*. 2011;40(9):718–22.
3. Zegers-Hochschild F, Adamson G, De Mouzon J, Ishihara O, Mansour R, Nygren K, et al. The International Committee for monitoring Assisted Reproductive Technology (ICMART) and the World Health Organization (WHO) Revised Glossary on ART Terminology 2009. *Hum Reprod*. 2009;24(11):2683–7.
4. Rayner JA, McLachlan HL, Forster DA, Cramer R. Australian women's use of complementary and alternative medicines to enhance fertility: exploring the experiences of women and practitioners. *BMC Complement Altern Med*. 2009;9:52.
5. Bovey M, Lorenc A, Robinson N. Extent of acupuncture practice for infertility in the United Kingdom: experiences and perceptions of practitioners. *Fertil Steril*. 2010;94(7):2569–73.
6. Anderson BJ, Haimovici F, Schust ES, Danny JW, Wayne PM. In vitro fertilisation and acupuncture: clinical efficacy and mechanistic basis. *Altern Ther Health Med*. 2007;13(3):38–48.
7. Klonoff-Cohen H, Natarajan L. The concerns during assisted reproductive technologies (CART) scale and pregnancy outcomes. *Fertil Steril*. 2004;81(4):982–8.
8. Karlidere T, Bozkurt A, Ozmenler KNMD, Ozsahin A, Kucuk T, Yetkin S. The Influence of Emotional Distress on the Outcome of In-vitro Fertilization (IVF) and/or Intracytoplasmic Sperm Injection (ICSI) Treatment among Infertile Turkish Women. *Isr J Psychiatry Relat Sc*. 2008;45(1):55–64.
9. Oddens BJ, Tonkelaar ID, Nieuwenhuys H. Psychosocial experiences in women facing fertility problems – a comparative study. *Hum Reprod*. 1999;14(1):255–61.
10. Skiadas CC, Terry K, Pari MD, Geoghegan A, Lubetsky L, Levy S, et al. Does emotional support during the luteal phase decrease the stress of in vitro fertilisation? *Fertil Steril*. 2011;96(6):1467–72.
11. Cwikel J, Gidron Y, Sheiner E. Psychological interactions with infertility among women. *Eur J Obstet Gynecol Reprod Biol*. 2004;117(2):126–31.
12. Cheong YC, Ng EHY, Ledger WL. Acupuncture and assisted conception. *Cochrane Database Syst Rev*. 2011(12).
13. El-Tourky T, Sunkara SK, Khairy M, Dyer R, Khalaf Y, Coomarasamy A. A systematic review and meta-analysis of acupuncture in in vitro fertilisation. *BJOG*. 2008;115:1203–13.
14. Chang R, Chung PH, Rosenwaks Z. Role of acupuncture in the treatment of female infertility. *Fertil Steril*. 2002;78(6):1149–53.
15. Lyttleton J. *Treatment of Fertility with Chinese Medicine*. China: Churchill Livingstone; 2004.
16. MIMS. MIMS Pharmaceutical Products Information Australia 2013. Available from: <<https://www.mimsonline-com-au.ezproxy.uws.edu.au/Search/Search.aspx>>
17. Furman I. Men's participation in psychologic counseling services offered during in vitro fertilisation treatments. *Fertil Steril*. 2010;94(4):1460–4.
18. Stewart JA. Best Practice: Infertility 2011. Available from: <<http://bestpractice.bmj.com.ezproxy.uws.edu.au/best-practice/monograph/498.html>>
19. Bouwmans CAM, Lintsen BAME, Al M, Verhaak CM, Eijkemans RJC, Habbema JDF, et al. Absence from work and emotional stress in women undergoing IVF or ICSI: An analysis of IVF-related absence from work in women and the contribution of general and emotional factors. *Acta Obstet Gynecol Scand*. 2008;87(11):1169–75.
20. Salakos N, Roupa Z, Sotiropoulou P, Grigoriou O. Family planning and psychosocial support for infertile couples. *Eur J Contracept Reprod Health Care*. 2004;9(1):47–51.
21. Kaliarnta S, Nihlen-Fahlquist H, Roeser S. Emotions and ethical considerations of women undergoing IVF treatments. *HEC Forum*. 2011;23:281–93.
22. Spinks J, Hollingsworth B. Policy Implications of Complementary and Alternative Medicine Use in Australia: Data from the National Health Survey. *J Altern Complement Med*. 2012;18(4):371–8.

23. Qu F, Zhou J, Ren RX. Effects of acupuncture on the outcomes of in vitro fertilization: a systematic review and meta-analysis. *J Altern Complement Med.* 2012 May;18(5):429–39.
24. Manheimer E, Zhang G, Udoff L, Haramati A, Langenberg P, Berman B, 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(7643):545–9.
25. Ioyama D, Barchi Cordts E, Angela Mara B, Carvalho WP, Matsumura ST, Parente Barbosa C. Effect of acupuncture on symptoms of anxiety in women undergoing in vitro fertilisation: a prospective randomised controlled study. *Acupunct Med.* 2012;30(2):85–8.
26. Margarelli PC, Cridennda DH, Cohen M. Changes in serum cortisol and prolactin associated with acupuncture during controlled ovarian hyperstimulation in women undergoing in vitro fertilisation-embryo transfer treatment. *Fertil Steril.* 2009;92(6):1870–9.
27. Balk J, Catov J, Horn B, Gecsi K, Wakim A. The relationship between perceived stress, acupuncture, and pregnancy rates among IVF patients: A pilot study. *Complement Ther Clin Pract.* 2010;16(3):154–7.
28. 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 Oct;17(10):923–30.
29. Kovárová P, Smith CA, Turnbull DA. An Exploratory Study of the Effect of Acupuncture on Self-Efficacy for Women Seeking Fertility Support. *Explore (NY).* 2010;6(5):330–4.
30. Wing Sze So E, Hung Yu Ng E, Yu Yeuk W, Shu Biu Yeung W, Pak Chung H. Acupuncture for frozen–thawed embryo transfer cycles: a double-blind randomized controlled trial. *Reprod Biomed Online.* 2010;20(6):814–21.
31. Deadman P, Al-Khafaji M, Baker K. *A Manual of Acupuncture.* 1 ed. East Sussex: Journal of Chinese Medicine Publications; 2001.
32. Birch S. A Review and Analysis of Placebo Treatments, Placebo Effects, and Placebo Controls in Trials of Medical Procedures When Sham Is Not Inert. *J Altern Complement Med.* 2006;12(3):303–10.
33. Zheng CH, Huang GY, Zhang MM, Wang W. Effects of acupuncture on pregnancy rates in women undergoing in vitro fertilization: a systematic review and meta-analysis. *Fertil Steril.* 2012;97(3):599–611.
34. Ritenbaugh C, Verhoef M, Fleishman S, Boon H, Leis A. Whole systems research: A Discipline for studying complementary and alternative medicine. *Altern Ther Health Med.* 2003;9(4):6.
35. Cassidy CM. Chinese medicine users in the United States. Part I: utilization, satisfaction, medical plurality. *J Altern Complement Med.* 1998;4(1):27.
36. Cochrane S, Smith CA, Possamai-Inesedy A. Development of a Fertility Acupuncture Protocol: Defining an Acupuncture Treatment Protocol to Support and Treat Women Experiencing Conception Delays. *J Altern Complement Med.* 2011;17(4):329–37.
37. De Lacey S, Smith C. Acupuncture and Infertility Treatment: Is There More to the Outcome for Women than Pregnancy? *Medical Acupuncture.* 2013;25(3):195–9.
38. Benedetti F. Placebo-Induced Improvements: How Therapeutic Rituals Affect the Patient's Brain. *J Acupunct Meridian Stud.* 2012 6;5(3):97–103.
39. Kelley JM, Lembo A, Ablon S, Villanueva J, Conboy L, Levy I, et al. Patient and Practitioner Influences on the Placebo Effect in Irritable Bowel Syndrome. *Psychosom Med.* 2009;71:789–97.
40. Stuardi T, MacPherson H. Acupuncture for irritable bowel syndrome: diagnosis and treatment of patients in a pragmatic trial. *J Altern Complement Med.* 2012 Nov;18(11):1021–7.
41. Hicks A. From Leamington Acupuncture to TCM and Back Again. *Traditional Acupuncture Society Journal.* 1989;11(1):7–11.
42. Lee SH, Wang SC, Kuo CP, Kuo PC, Lee MS, Lee MC. Grief responses and coping strategies among infertile women after failed in vitro fertilization treatment. *Scand J Caring Sci.* 2010;24(3):507–13.
43. Kowalcsek I, Kasimzade T, Huber G. Expectations for success in fertility treatment involving assisted reproduction. *Arch Gynecol Obstet.* 2003;268:78–81.
44. Marcus D, Marcus A, Johnson A, Marcus S. Infertility treatment: When is it time to give up? An internet-based survey. *Hum Fertil.* 2011;14(1):29–34.
45. Verhaak CM, Smeenk MJ, Evers AWM, Kremer JAM, Kraaijaat FW, Braat DDM. Women's emotional adjustment to IVF: a systematic review of 25 years of research. *Hum Reprod Update.* January/February 2007;13(1):27–36.