

A Review of Acupuncture's Effect on Reproductive Hormones and the Uterus

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ABSTRACT

Acupuncture is used to treat a vast array of reproductive and gynecological conditions. Though acupuncture seems to be effective in treating these conditions, often its mechanism of action is unclear. This begs the question: what is acupuncture's direct effect on our reproductive physiology? In reviewing current research, it is clear that acupuncture regulates the reproductive system via hormone pathways, as well as directly effecting the uterus.

Some of acupuncture's direct actions on the uterus are structural, such as angiogenesis and endometrial thickness, while others are on a functional level such as strength and intervals of uterine contractions. Hormonally, acupuncture has been shown to alter levels of progesterone and prolactin serum levels, FSH, LH, estradiol levels, testosterone and more. Perhaps as a result of regulating a patient's hormone levels, mood and mental-emotional status also appears to improve with acupuncture.

INTRODUCTION

The purpose of this paper is to consolidate information on acupuncture's effectiveness and mechanism of action in the treatment and prevention of reproductive disorders. This review is intended to weave together common threads among research literature, so that we may observe and make meaning of acupuncture's potential for impacting and improving gynecological health.

METHOD

Databases searched for the writing of this paper include the US National Library of Medicine, National Institutes of Health, National Center for Biotechnology Information, and PubMed Central. Search terms included "acupuncture AND progesterone" (96 results), "acupuncture AND PCOS" (182 results), and "acupuncture AND uterus" (184 results). Search results were refined with a focus on well-designed randomized control trials conducted between the years 2000-2020.

The inclusion criteria for the featured studies consist of women who have hormonal irregularities (such as those with Polycystic Ovarian Syndrome), fertility issues (such as those receiving in vitro fertilization support), or issues with the uterus (such as blood flow or dystocia). Any other referenced studies outside of these criteria observed rats and either assessed for changes in hormone levels and/or structural changes of the uterus.

DISCUSSION

Acupuncture's hormonal mechanism of action

Many studies demonstrate acupuncture having a direct effect on hormone levels within the body. In both rats and humans, acupuncture studies have shown an alteration of serum hormone levels in a homeostatic manner, raising low levels while reducing high levels of various hormones. One simple example is a randomized control trial conducted in 2015 that considered 72 rats with embryo implantation dysfunction. This trial found that rats who received acupuncture had a statistically significant increase of both progesterone and prolactin serum levels, which facilitate optimal endometrial conditions for implantation. [1].

In another randomized control trial, 40 adult women with Polycystic Ovarian Syndrome (PCOS) were split into two groups: the control group received only exercise and dietary guidance, and the treatment group received acupuncture in addition to this guidance. All interventions took place 3 times per week for 4 months. In the treatment group, the following results were significantly lower than the control group: self-rating depression scale score, self-rating anxiety scale score, hirsutism scores, and serum free testosterone level (all $P < 0.05$) [2]. In addition, quality of life survey scores and serum β -endorphin levels were higher in the acupuncture group ($P < 0.05$). The results of this study suggest that acupuncture regulates serum hormone levels, in this case lowering testosterone while raising endorphins. In addition, this study illustrates acupuncture's capacity for improving mental-emotional experience, perhaps via this hormonal pathway.

The next study also examined patients with PCOS, randomly assigning 60 women to either an acupuncture group or a western medication group. The acupuncture group received an identical treatment protocol 3 times per week, beginning on the 5th day of menstruation, for 3 months. The western medication group was given "diane-35", a hormonal combination of progesterone and estrogen that has been used to regulate hormones and treat acne, acne being a common symptom of PCOS. This medication was also administered on the 5th day of menstruation, daily for 21 days per month, for the course of 3 months [3].

Both the acupuncture and western medication groups had a similarly significant result in decreasing acne. Both groups also saw a similarly significant increase in FSH and LH, and a lowering in testosterone, with the western medication lowering testosterone only slightly more than acupuncture. These results indicate that acupuncture has a regulatory effect on the body. Typically, PCOS patients have elevated testosterone, which acupuncture significantly decreased in this study, and relatively low FSH, which acupuncture increased just as well as oral hormone therapy [4]. Menstrual cycles were

also shortened after 3 months of acupuncture in this population who tend to have extended cycles.

Another study comparing the effects of hormone therapy and acupuncture included three hundred female rats and 20 male rats in a randomized control trial, the males mating with female rats to induce pregnancy. Female rats were then randomly divided into groups which included a control group, a group dosed with progesterone to cause controlled ovarian hyperstimulation (mimicking human fertility medication interventions), an acupuncture group, and an acupuncture in addition to progesterone group. Many crucial findings resulted from this study. First, the pregnancy rate of the groups differed, with the acupuncture group having a higher pregnancy rate than the control ($p < 0.05$) and the acupuncture combined with progesterone group being even higher ($p < 0.01$) [5].

Acupuncture's effect on the uterus

In addition to changes in pregnancy rate and progesterone, this study observed changes in the uterus. Acupuncture treatment alone improved the expression of vascular endothelial growth factor (VEGF), while progesterone alone did not have the same effect. By the eighth day of gestation, expression of VEGF protein was double the value in both the acupuncture group, as well as the acupuncture with progesterone group, compared to the progesterone group alone. Acupuncture alone also regulated the mRNA and protein expression of fibroblast growth factor 2 just as progesterone did. These two growth factors are crucial in regulating "the angiogenic process at the fetal-maternal interface during implantation", and acupuncture and progesterone both "regulated proliferation, tube formation, and migration of uterus dendritic cells" [5]. These findings have important implications for the use of acupuncture in improving endometrial angiogenesis and, hence, female health and fertility. The results suggest that acupuncture is just as effective, and possibly more effective in some cases, for increasing endothelial growth factor.

Closely related to endometrial angiogenesis is endometrial receptivity, which essentially reflects endometrial blood flow and health. Another randomized control trial observed 114 participants who had in vitro fertilization-embryo transfers. Half of the women were in a control group with no intervention and the other half received three sessions of acupuncture and moxibustion at the beginning of ovulatory induction. The study found serum estradiol and progesterone levels to be significantly higher in the acupuncture and moxibustion group on the day of human chorionic gonadotropin (hCG) injection than the control ($p < 0.05$). Additionally, the resistive index was lower in the acupuncture group, meaning that with less blood vessel narrowing, endometrial blood flow increased, enhancing endometrial receptivity [6].

This has great implications for acupuncture and moxibustion as effective and important complementary medicine for IVF patients.

Continuing with fertility and uterine blood perfusion, another randomized control trial of 72 women sought to observe how warming acupuncture (with moxibustion) might impact uterine blood flow. This study specifically chose participants who previously had a failed high-quality freeze-thawed embryo transfer, and were observing the effects of warming acupuncture upon re-transfer. [7]. Women were separated into two groups: the control group and the acupuncture group. For the acupuncture group, warming acupuncture was administered on select points for 50 minutes per session for the 4 days following menstruation, then a break day, and then everyday again until the end of ovulation. The control group was given a placebo pill during this same period with 3 capsules 3 times per day. Results showed that the acupuncture group had an increase of uterine blood flow and endometrial receptivity during implantation, as well as an increased rate of clinical pregnancy ($p < 0.05$) [7].

Another way that acupuncture acts directly on the uterus is through either stimulating or inhibiting physical contractions. The following two studies had fascinating results in observing the effect of needling a single specific acupuncture point, Large Intestine 4 (LI 4), also called Hegu or "joining valley". The first study is a randomized control trial observing both pregnant and non-pregnant rats. Results showed that needling LI 4 inhibited the expression of COX-2, which is a prostaglandin that increases during pregnancy and ultimately contributes to the contractions of the uterus required to give labor. [8]. This finding of significant reduction in uterus motility suggests that the needling of LI 4 during pregnancy might be helpful in the prevention of preterm labor or miscarriage.

Another study on needling acupuncture point LI 4 and its impact on the uterus involved 276 female participants in a randomized control trial. Half of the participants were assigned to a western medicine group, which involved intravenous drip of oxytocin, and the other half had the same treatment but with the addition of electroacupuncture at LI 4 in regular intervals. The difference between the two groups was highly significant when it came to changes of inertia of the uterus as well as duration and intervals of uterine contractions: "the effective rate was 97.1% in the acupuncture group, and 70.3% in the western medicine group ($P < 0.01$)" [9]. These findings suggest that electroacupuncture stimulation at LI 4 can be utilized in the treatment of dystocia and other uterine contraction abnormalities.

LIMITATIONS

This review has several limitations. One weakness is inherent in much of acupuncture research in general: it remains difficult to control for the psychological experience that

is inextricable from the receiving of acupuncture. Patient-practitioner relationship and interaction may have an impact on mental emotional states, nervous system activity, and other physiological mechanisms in the body. If we are to view acupuncture as a holistic medicine, however, it is inconsequential how much these psychological factors play a role; the most crucial aspect is observing changes within the body caused by acupuncture treatment. Another limitation of this review were sample sizes; many of these studies involved less than 100 participants. More extensive and large-scale research must be done.

CONCLUSION

In summary, the findings reviewed in this paper indicate that acupuncture is not only an effective complementary medicine to usual care when it comes to women's health and gynecology, but an effective medicine on its own.

In addition, comprehending acupuncture's mechanism of action in relation to hormone regulation and physiological changes in the uterus as a structure is beneficial. The expansion of this comprehension has the potential to guide policy at state and federal levels. Results from the research outlined in this paper have implications for expanding health insurance coverage for acupuncture beyond just specific types of pain, but for reproductive health and disease prevention as well. If women in the U.S. could receive acupuncture treatments through insurance coverage, there would be less reliance on hormone medication and anti-depressants which can cause undesirable side effects. Acupuncture is a safe, natural and effective alternative to more aggressive treatments for reproductive conditions and fertility support, and should be considered as an option for the first line of defense in treating women's health.

The author declares no competing interests in the writing of this paper.

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