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Evaluation of the Efficacy of Auricular Acupuncture, Transcutaneous Electrical Nerve Stimulation, and Nonsteroidal Anti-Inflammatory Drugs in Relieving Postpartum Uterine Pain

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Abstract: *Objective:* To explore the efficacy of auricular acupuncture combined with transcutaneous electrical nerve stimulation (TENS) and nonsteroidal anti-inflammatory drugs (NSAIDs) in alleviating postpartum uterine pain. *Methods:* A total of 501 postpartum women with uterine pain were randomly divided into an experimental group (n = 250) and a control group (n = 251). The control group received oral NSAIDs (such as ibuprofen sustained-release capsules, diclofenac sodium suppositories, etc.), while the experimental group received auricular acupuncture and TENS in addition to the NSAIDs. The clinical efficacy, pain intensity, and vaginal bleeding volume of the two groups were observed. *Results:* The total effective rate in the experimental group (93.20%) was significantly higher than that in the control group (73.20%) (P < 0.001). The NRS scores in the experimental group were lower than those in the control group after the intervention, and the bleeding volume within 24 h and 48 h after the intervention was also less than that in the control group, with significant differences (all P < 0.001). *Conclusion:* Auricular acupuncture combined with TENS and NSAIDs for the treatment of postpartum uterine pain is safe and effective, can significantly reduce pain and vaginal bleeding, and is worthy of clinical promotion.

Keywords: Auricular acupressure; Transcutaneous electrical nerve stimulation; Nonsteroidal anti-inflammatory drugs; Postpartum uterine pain; Analgesia

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1. Introduction

Postpartum uterine pain is a common symptom experienced by women after childbirth. Its impact is

multidimensional, not only affecting the physical sensations of women but also causing significant psychological, social, and emotional distress, thus hindering postpartum recovery [1]. From a physical perspective, persistent pain causes fatigue, and discomfort, interferes with normal rest and activity, and slows down the recovery of bodily functions. Psychologically, pain torture can easily induce anxiety, irritability, and other negative emotions, and in severe cases, can lead to postpartum depression. Socially, poor postpartum conditions can reduce social interaction and lead to isolation. Spiritually, long-term pain can affect one's positive life experience. It is worth noting that breastfeeding can further stimulate uterine contractions, aggravating postpartum pain, and many women refuse early breastfeeding due to unbearable pain, which significantly reduces the success rate of breastfeeding.

Currently, there are various interventions for postpartum uterine pain in clinical practice, which can be generally divided into two categories: drug intervention and non-drug intervention [2]. Among drug interventions, nonsteroidal anti-inflammatory drugs (NSAIDs) have been widely used in clinical treatment due to their significant analgesic effects and have become a preferred analgesic drug. For example, ibuprofen and diclofenac sodium can effectively reduce women's pain perception by inhibiting the production of inflammatory mediators in the body. However, long-term use of these drugs may cause a series of side effects such as gastrointestinal discomfort, peptic ulcers, and liver and kidney damage, posing additional health risks to women who are already relatively weak.

Traditional Chinese medicine has a long history, and "traditional Chinese medicine therapies" as an important component contain a rich variety of therapeutic methods with a wide range. Not only do they have the advantages of being safe and effective, but they can also reduce treatment costs to a certain extent, making them have a high application value [3]. Auricular acupuncture therapy, as a typical representative of traditional Chinese medicine therapy, has a unique theoretical basis and operation methods. Traditional Chinese medicine believes that the ear is the convergence of the body's meridians and qi and blood, and there are many acupoints corresponding to the internal organs. By stimulating specific acupoints, the body's qi and blood circulation and the balance of visceral functions can be adjusted, thereby achieving analgesic and anti-inflammatory effects. Moreover, traditional Chinese medicine believes that uterine pain is caused by a deficiency of qi and blood and stasis of blood in the uterus. The San Yin Jiao acupoint can reduce uterine pain and reduce postpartum bleeding. This study aims to explore the efficacy of auricular acupuncture combined with transcutaneous electrical nerve stimulation and nonsteroidal anti-inflammatory drugs in alleviating postpartum uterine pain, providing a safer and more effective treatment method for clinical practice.

2. Materials and methods

2.1. General information

A total of 501 postpartum women who gave birth in our hospital from January 2023 to December 2023 were selected. The experimental group consisted of 250 women, aged 20–37 years, with an average age of 26.15 ± 4.31 years; the control group consisted of 251 women, aged 22–40 years, with an average age of 28.33 ± 5.08 years. Inclusion criteria: (1) Age 20–40 years; (2) Singleton vaginal delivery or cesarean section, excluding the interference of multiple pregnancies; (3) Moderate or above postpartum uterine pain (NRS score ≥ 4); (4) Willing to participate in the study and signed the informed consent form. Exclusion criteria: (1) Existence of ear diseases such as skin damage and infection; (2) Allergy to nonsteroidal anti-inflammatory drugs or severe gastrointestinal diseases; (3) Comorbidities such as cardiovascular and cerebrovascular diseases, liver and kidney dysfunction, and severe systemic diseases; (4) Postpartum women with mental disorders or cognitive impairment who cannot

cooperate with the research process. There were no statistically significant differences between the two groups in terms of age, gestational age, and mode of delivery ($P > 0.05$), indicating that the two groups were comparable.

2.2. Methods

2.2.1. Control group

The control group was treated with nonsteroidal anti-inflammatory drugs. The specific medication was: ibuprofen sustained-release capsules 0.3 g, taken orally 3 times a day, or diclofenac sodium suppositories 50 mg, administered rectally twice a day. Medical staff should explain in detail to postpartum women the usage, dosage, and possible adverse reactions of the drugs, ensure that women can use the drugs correctly, and closely observe the women's physical reactions during the medication process.

2.2.2. Experimental group

On the basis of the treatment with nonsteroidal anti-inflammatory drugs in the control group, auricular acupuncture and transcutaneous electrical nerve stimulation (TENS) were combined. The specific operation is as follows:

(1) Acupoint selection: A professional acupuncturist selects acupoints such as the uterus, sympathetic, Shenmen, and subcortex according to the theory of Chinese meridian and clinical experience. The uterus acupoint is a specific acupoint corresponding to the regulation of uterine function. Stimulating this acupoint helps regulate the contraction state of the uterus and relieve uterine pain; the sympathetic acupoint can regulate the body's autonomic nervous system function and improve the neuropathic pain caused by uterine contraction; the Shenmen acupoint has a calming and sedative effect, which can relieve the anxiety caused by pain in postpartum women and, to a certain extent, help reduce pain sensation; the subcortex acupoint is related to the regulation of the cerebral cortex function and can affect the body's perception of pain by regulating the excitability of the nervous system. San Yin Jiao has the functions of activating blood circulation, removing blood stasis, and relieving pain; the uterus acupoint has the functions of regulating menstruation, promoting pregnancy, and relieving pain; the Di Ji acupoint has the functions of relieving pain and abdominal pain.

(2) Moxibustion materials and operation: Bismuth stone was selected as the moxibustion material, and medical adhesive tape was used to fix the bismuth stone at the selected acupoints. The force of moxibustion should be moderate, and the sensation of soreness, numbness, distension, and pain should be felt at the local acupoint, but excessive force should be avoided to cause skin damage. The usage was 3–5 acupoints per time, alternating between the two ears. When changing the moxibustion, it is necessary to observe whether there are any abnormal conditions such as redness, swelling, and itching at the ear acupoints, and make corresponding records. At the same time, during the moxibustion process, postpartum women were guided to press the moxibustion site by themselves, 1–2 minutes each time, once every 2-3 hours, to enhance the stimulation effect.

(3) Transcutaneous electrical nerve stimulation: The acupoints San Yin Jiao, uterus, and Di Ji were selected [4].

2.3. Observation indicators

2.3.1. Clinical efficacy

According to the degree of pain relief in postpartum women, it was divided into three levels: complete relief, partial relief, and no relief.

(1) Complete relief: The symptoms of postpartum uterine pain in postpartum women completely disappeared,

and daily activities and rest were no longer affected by pain;

(2) Partial relief: The pain level of postpartum women was significantly reduced compared with that before treatment, although there was still some pain sensation, but it did not affect basic rest and daily activities;

(3) No relief: The pain condition of postpartum women did not improve significantly after treatment and still had a great impact on quality of life [5].

2.3.2. Pain intensity

The Numerical Rating Scale (NRS) was used. Through 11 numbers from 0 to 10, the degree of pain was described. Among them, "0" represents no pain, and "10" represents the most intense pain that the patient can imagine. Postpartum women were asked to score according to their own pain sensation, and the obtained score was the pain intensity score. By comparing the scores before and after the intervention, the improvement effect of the treatment was reflected.

2.3.3. Vaginal bleeding volume

The vaginal bleeding volume of postpartum women within 24 h and 48 h after the intervention was compared. Standardized postpartum sanitary napkins were used to collect vaginal bleeding, and the bleeding volume was accurately recorded.

2.4. Statistical analysis

SPSS 27.0 software was used for statistical analysis. Measurement data were expressed as mean ± standard deviation (SD) and analyzed using *t*-tests; count data were expressed as [*n* (%)], and analyzed using chi-squared tests. $P < 0.05$ was considered statistically significant.

3. Results

3.1. Comparison of clinical efficacy between two groups

Table 1 shows that the total effective rate of clinical efficacy in the experimental group (93.20%) was significantly higher than that in the control group (73.20%), with a highly significant difference ($P < 0.001$).

Table 1. Comparison of clinical efficacy between the two groups [*n* (%)]

Group	*n*	Complete relief	Partial relief	No relief	Total effective rate
Control	251	75 (30.00%)	108 (43.20%)	67 (26.80%)	183 (73.20%)
Experimental	250	133 (53.20%)	100 (40.00%)	17 (6.80%)	233 (93.20%)
χ^2	-	-	-	-	35.772
P	-	-	-	-	< 0.001

3.2. Comparison of NRS scores before and after intervention in the two groups

There was no statistically significant difference in NRS scores between the two groups before the intervention (*P*

> 0.05). After the intervention, the NRS scores in the experimental group were significantly lower than those in the control group ($P < 0.001$). See **Table 2**.

Table 2. Comparison of NRS scores before and after intervention in the two groups (mean ± SD, points)

Group	*n*	Before intervention	After intervention	*t*	*P*
Control	251	7.37 ± 1.09	1.84 ± 0.77	65.518	< 0.001
Experimental	250	7.46 ± 1.05	1.04 ± 0.12	96.050	< 0.001
t		0.940	16.232	-	-
P		0.348	< 0.001	-	-

3.3. Vaginal bleeding volume in the two groups

Within 24 h and 48 h after the intervention, the experimental group had less bleeding than the control group, with highly significant differences (both $P < 0.001$), as shown in **Table 3**.

Table 3. Vaginal bleeding volume in the two groups (mean ± SD, mL)

Group	*n*	Within 24 h	Within 48 h
Control	251	311.27 ± 22.19	385.23 ± 29.49
Experimental	250	216.47 ± 17.09	299.87 ± 25.31
t		53.517	34.730
P		< 0.001	< 0.001

4. Discussion

From a traditional Chinese medicine perspective, postpartum uterine pain is closely related to the physiological changes of the uterus after childbirth. After childbirth, the uterus needs to contract continuously to gradually recover to its original size before pregnancy, and it is during this process of contraction and recovery that pain occurs [6]. Especially during the postpartum uterine recovery phase, breastfeeding can stimulate the uterus, causing the body to secrete oxytocin, which further aggravates uterine contractions and induces more significant lower abdominal pain. Moreover, this pain does not occur alone but is often accompanied by various adverse reactions, such as nausea, vomiting, loss of appetite, and insomnia, which have a serious negative impact on both the physical and mental health of postpartum women, greatly disrupting the postpartum recovery of women's daily life and physical and mental health.

At present, the medical field pays more and more attention to postpartum uterine pain, and relevant research is constantly deepening and expanding. Many traditional Chinese medicine interventions have attracted much attention in alleviating this pain, such as acupuncture [7], which relies on acupuncture at specific acupoints to achieve the effect of dredging meridians and regulating qi and blood, thereby regulating the qi and blood circulation of the uterus and relieving uterine pain; acupuncture massage uses manual stimulation of acupoints according to the functions of acupoints to regulate qi and relieve pain [8]; and Chinese medicine moxibustion uses the warm properties and drug penetration function of Chinese medicine to achieve the purpose of warming the meridians and dispelling cold and pain [9]. Many practices have shown that these traditional Chinese medicine

interventions, whether combined or used alone, can often achieve relatively ideal clinical effects, which have significant advantages compared with the simple use of drug interventions, providing more effective and safe options for the treatment of postpartum uterine pain.

This study shows that the total effective rate of clinical efficacy in the experimental group was higher than that in the control group ($P < 0.001$), and after the intervention, the NRS scores in the experimental group were lower than those in the control group, and the vaginal bleeding volume within 24 hours and 48 hours was also less than that in the control group ($P < 0.001$). In-depth analysis of the underlying reasons, there are mainly the following aspects:

(1) The positive effects of auricular acupuncture. The application of moxibustion to relevant acupoints of the ear, similar to acupuncture massage stimulation, can promote the regulation of qi and blood and dredge meridians, thereby reducing pain [10]. At the same time, auricular acupuncture can promote the increase of serum serotonin and brain-derived neurotrophic factor levels, effectively alleviating pain and regulating the overall state of the body from the perspective of the body's internal physiological mechanism, laying a good foundation for improving postpartum uterine pain [11].

(2) The analgesic mechanism of transcutaneous electrical nerve stimulation: By stimulating large-diameter nerve fibers, activating glial cells, and then inhibiting the transmission of nociceptive signals from small-diameter fibers. In addition, it can promote the central nervous system to release endogenous opioids, increase the pain threshold, and induce widespread analgesia through the descending pain inhibition pathway.

(3) The role of nonsteroidal anti-inflammatory drugs: Nonsteroidal anti-inflammatory drugs themselves have the characteristics of weak acidity, poor lipid solubility, and high protein binding rate, and can play a corresponding role in the process of alleviating postpartum uterine pain [12]. Ibuprofen and diclofenac sodium suppositories used in this study belong to new anti-inflammatory and analgesic drugs and are derivatives of isobutyric acid. These drugs have strong antipyretic and analgesic effects and can act on the body of postpartum women to inhibit the synthesis and release of prostaglandins, thereby effectively reducing pain [13].

Overall, the combined treatment of auricular acupuncture and nonsteroidal anti-inflammatory drugs has exerted a positive and good effect on improving postpartum uterine pain by working together from different dimensions.

5. Conclusion

In summary, auricular acupuncture combined with transcutaneous electrical nerve stimulation and nonsteroidal anti-inflammatory drugs has shown significant advantages in dealing with postpartum uterine pain. Through actual comparison, its effectiveness in reducing pain and vaginal bleeding is outstanding, and the differences in various related indicators are very convincing. In view of this, this combined treatment method has a high value of clinical application and is worthy of being widely promoted in various medical institutions, so that more postpartum women suffering from postpartum uterine pain can benefit and help them to spend the postpartum recovery period more comfortably and smoothly.

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Disclosure statement

The authors declare no conflict of interest.

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