

Original Paper

Effect of Auriculotherapy on the Anxiety of Women After Cesarean Section: A Clinical Trial



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ABSTRACT

Introduction: Anxiety after cesarean section can delay the recovery process of mothers after delivery. Auriculotherapy as a complementary medicine may be beneficial in reducing maternal anxiety.

Objective: This study assesses auriculotherapy's effect on women's anxiety after cesarean section.

Materials and Methods: This randomized controlled clinical trial was conducted on 88 women after cesarean section in a teaching hospital in Rasht City, Iran. The mothers were assigned into intervention groups (n=34) and control (n=34). In the intervention group, auriculotherapy was performed by Vaccaria seeds on 1 point in the left ear and 5 points in the right ear. The mothers' anxiety was measured by the Spielberger state-trait anxiety inventory (STAI) before, 3, and 10 days after the intervention. The collected data were analyzed by using the independent t-test, Fisher exact test, and repeated measures ANOVA. Analysis of covariance (ANCOVA) was also used to compare the STAI score between the two groups after the intervention. The significance level was set at 0.05.

Results: The Mean±SD age of the participants was 31.8±7.2 years. In the intervention group, no significant difference was found in the state and trait anxiety scores from baseline to day 3 after the intervention. However, their mean scores were significantly reduced on the 10th day after the intervention compared to the scores at baseline and day 3 (P=0.001). In the control group, the mean state anxiety score on the third day was significantly higher than at baseline and day 10 (P=0.001, $\eta^2=0.249$). At the same time, there was no significant difference in trait anxiety scores from the baseline to the third day. However, these values increased on day 10 (P=0.001). According to the ANCOVA results, the adjusted means of state and trait anxiety in the intervention group were lower than in the control group on the 3rd and 10th days; these values decreased more from the third to the tenth day (P=0.001, $\eta^2=0.829$).

Conclusion: Auriculotherapy effectively reduces mothers' anxiety after cesarean section. Therefore, health service providers, especially midwives, can use this complementary medicine to reduce mothers' anxiety.

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Highlights

- Anxiety is one of the important psychological disorders that can affect the quality of life of mothers.
- Auriculotherapy using Vaccaria seeds is a cost-effective and easy-to-use method.
- Auriculotherapy is effective in reducing the anxiety of mothers after cesarean section.

Plain Language Summary

After giving birth, anxious mothers face a decrease in self-efficacy, an increase in depression, less success in exclusive breastfeeding, and a disruption in their interaction with the child, especially in countries with low social support for women during pregnancy and after childbirth. Due to its invasiveness and causing fear, cesarean section is associated with increased maternal anxiety. This issue affects not only the mother's health but also the health of other family members. Auriculotherapy is a suitable alternative to the use of sedatives and benzodiazepines. The present study was conducted to determine the effect of auriculotherapy on state and trait anxiety in 68 women with cesarean section. The results showed that auriculotherapy can reduce mothers' anxiety after cesarean section.

Introduction

Cesarean section is one of the most common and important surgeries in obstetric practice that is performed for women who are at risk for problems to save the life of the mother and the fetus [1]. The cesarean section rate in the world ranges from 15% to 81% [2]. In Iran, 47.5% of births are given by cesarean section [3]. Its physical and psychological harms and risks are 2-4 times more than those of natural childbirth [4]. The mother's feeling of failure, despair, and anxiety after a cesarean section is among these psychological complications [5]. The anxiety level in people hospitalized for non-surgical reasons is 10%-30%, and in cases of hospitalization due to surgery, it is 60%-80% [6]. The amount of postpartum anxiety in cesarean section cases (30%) is higher than in normal delivery cases and its frequency is 18% [7]. Anxiety is a multidimensional variable. The state anxiety dimension occurs when facing tension and frightening situation. The trait anxiety dimension is a chronic response to a situation as a personality trait [8]. Anxiety can be associated with procoagulative and vascular changes [9]. Anxious mothers usually tend to feed their babies with artificial milk, which can cause poor growth and development of the newborn, sleep disorders, a decrease in the mother's self-efficacy, and cognitive and social interaction problems in the baby [10, 11]. Weakness in child supervision and the formation of unfavorable mother-child relationships are other consequences of maternal anxiety [12, 13].

The postpartum period is an important stage of life when the mother faces many challenges [14]. Each of these challenges can cause anxiety after surgery [15]. The subjective experience of giving birth with satisfaction plays an effective role in the tendency to give birth again [16]. Therefore, anxiety management can increase the mother's satisfaction and uterine contraction [17]. Today, complementary medicine methods are considered one of the ways to reduce anxiety [18]. In traditional Chinese medicine, auriculotherapy is a subset of acupuncture, a branch of reflexology, and a type of complementary medicine. Certain points in the ears, hands, and feet are connected to other internal parts of the body through meridians or energy lines [19]. Acupressure is a management technique in auriculotherapy that helps activate the corresponding points in the ear or body and release energy throughout the body. According to this therapy, the disease is the result of disturbing the energy balance in the body. Therefore, creating a balance and opening the blocked pathways can improve the disease and correct the health pattern of the body [20]. As a complementary medicine, this treatment is an easy, safe, useful, acceptable, non-invasive, and low-complication method that helps treat acute and chronic diseases in the motor, nervous, cardiac, digestive, and urological systems with no adverse effect on breast milk and babies [21]. Some studies confirm that auriculotherapy can significantly reduce anxiety [22, 23], while others showed no significant reduction in anxiety after auriculotherapy [18, 24]. The existence of conflicting results about the effect of auriculotherapy on patients' anxiety and the importance of the maternal role in the family's foundation makes it necessary to de-

tect the mother's anxiety early and try to solve it to ensure the health of the family and society. Therefore, this study aims to determine the effect of auriculotherapy on postpartum anxiety in women with cesarean section.

Materials and Methods

This randomized clinical trial was conducted on women after cesarean section in one of the teaching hospitals in Rasht City, Iran. The sample size was calculated at 74 using G*Power software, version 19 at a 95% confidence interval by considering a test power of 80% and a large effect size (d) of 0.8. The inclusion criteria were as follows: Signing a written informed consent form, reading and writing literacy, full-term pregnancy, singleton delivery, healthy delivery, and having a non-emergency cesarean section. The exclusion criteria were as follows: Speech and hearing or mental problems that prevent communication with the researcher, medical and obstetric disorders, onset of labor pains based on the medical records and self-report, migraines, history of auriculotherapy, presence of wounds, cysts or moles on the ear, smoking cigarette or hookah, use of alcohol or sedatives, experiencing traumatic events in the last 6 months such as divorce, death of a family member or relatives, unwillingness to continue participation, the occurrence of any complications due to surgery, and anesthesia for mother and baby. Sampling was done using a convenience sampling method. The participants were assigned to two groups of intervention ($n=38$) and control ($n=38$) using the block randomization method (using block sizes of 4 and 6 on the Sealed Envelope website [25]).

The data collection tools were a demographic/social/clinical profile form (surveying age, husband's age, level of education, occupation, income, number of children, gestational age, type of anesthesia, blood pressure, number of pulses, body temperature, and breathing) and the Spielberger state-trait anxiety inventory (STAI). This questionnaire was developed by Spielberger [26] and has 40 items, 20 related to state anxiety and 20 to trait anxiety. The items are rated on a 4-point Likert scale: "1=not at all, 2=sometimes, 3=moderately, and 4=very much" for state anxiety subscale and "4=almost never, 3=sometimes, 2=often, and 1=almost always" for trait anxiety subscale. The total score ranges from 20 to 80, where higher scores indicate greater anxiety. In the state anxiety subscale, a score of 20-30 indicates no anxiety, a score of 31-42 indicates mild anxiety, a score of 43-53 indicates moderate anxiety and a score ≥ 54 shows severe anxiety. In the trait anxiety subscale, a score of 20-34 indicates no anxiety, a score of 35-45

indicates mild anxiety, a score of 46-56 indicates moderate anxiety and a score ≥ 57 shows severe anxiety. This study used the Persian version of STAI, whose psychometric properties have already been studied [27].

Before the study, while receiving the necessary education about auriculotherapy, the researcher participated in an auriculotherapy workshop with an expert in acupuncture and Chinese medicine and acquired the skills needed and relevant certificates in auriculotherapy. Before the intervention, explanations were given to the mothers quietly and privately, where a divider separated the mothers' beds, and they could not see each other. On the first day after the cesarean section, when the mothers' vital signs were normal and they had breastfed their infants, both groups completed the STAI. Then, auriculotherapy was performed on the external ear of mothers in the intervention group. For this purpose, the ear's skin was cleaned with cotton soaked in 70% alcohol to remove the fat from the skin in the desired areas. Then, the Vaccaria seeds were attached to the external ear at 6 points by an adhesive sticker (Figure 1) such that one seed was on Shen men point in the left ear and 5 seeds on master shoulder, thalamus, muscle relaxation, liver, and anxiety points in the right ear. Then, for 2 minutes, the researcher applied gentle and constant pressure on each point (12 minutes in total). Then, the mothers were asked to repeat the 2-min pressures on each seed 12 hours later, according to the instructions, until they felt warmth and tingling. On the second day after the cesarean section, auriculotherapy was done again by mothers twice a day at an interval of 12 hours. On the third day after the cesarean section and before discharge from the hospital, the mothers completed the STAI again. The seeds remained on the ear for another week. They were told that the researcher would remove the seeds one week later (i.e. on the 10th day after the cesarean section, when they went to the hospital to remove the staples of the cesarean section) and that they would complete the STAI again. They were asked to press the mentioned points every hour for one minute during waking hours [28]. To ensure the intervention, the researcher reminded the mothers every other day by phone. They were also given a checklist to record the pressure on the ear points. No intervention was given to the control group; they just received routine postpartum care. Each participant received painkillers if needed. Since mothers usually take a simple shower until the 10th day, the seeds were moved in two participants; hence, they were excluded from the study. Figure 2 shows the process of sampling and allocation. Ultimately, the collected data were analyzed



Figure 1. The Vaccaria seeds and pressure points

in SPSS software, version 16 using the independent t-test, Fisher exact test, and repeated measures ANOVA. Analysis of covariance was also used to compare the STAI score between the two groups after intervention. The significance level was set at 0.05.

Results

In this study, 68 women with a Mean±SD age of 31.8±7.2 years participated. Their Mean±SD gestational age was 38.31±0.67 weeks. There were no statistically significant differences between the two groups regarding demographic characteristics (Table 1). The mean

scores of state and trait anxiety before the intervention were not significantly different between the two groups (Table 2). The mean anxiety scores during the intervention in the two study groups are presented in Table 3.

According to the Bonferroni test results, the mean state anxiety score on the 10th day was significantly lower than the baseline (P=0.001) and third-day (P=0.001) values. However, no statistically significant difference was found in state anxiety between the baseline and third-day scores. There was also a difference in mothers' mean state anxiety scores in the control group during the intervention (P=0.001). The mean state anxiety score of the control group on the third

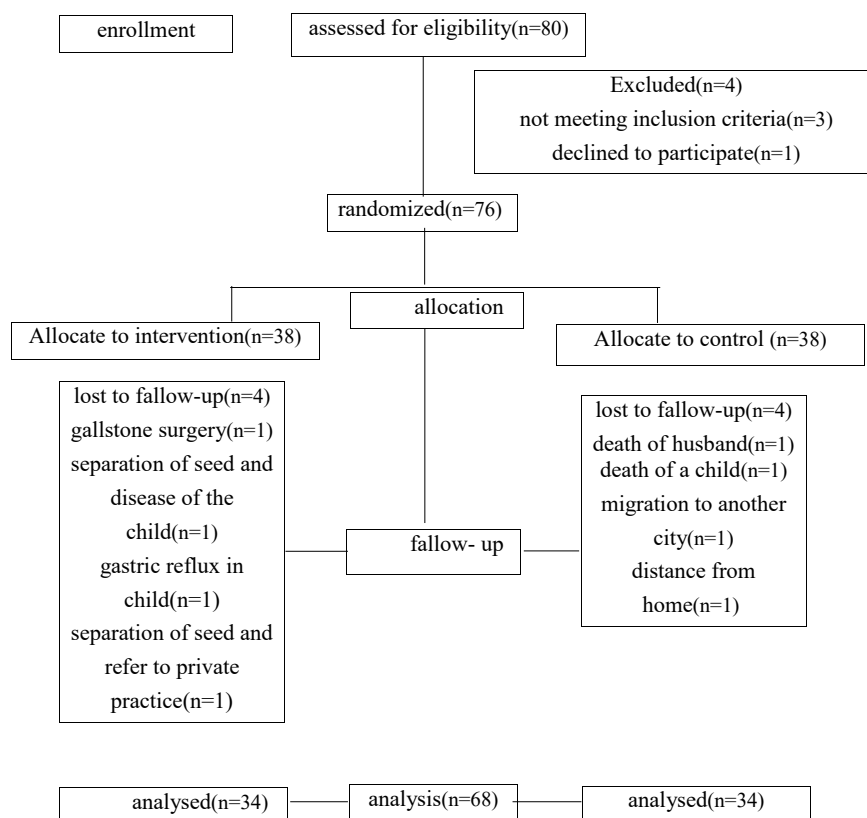


Figure 2. CONSORT diagram

Table 1. Demographic, social, and clinical characteristics of the participants

Variables	Mean±SD/No. (%)		P
	Control (n=34)	Intervention (n=34)	
Age (y)	32.5±7.1	31.1±7.3	0.420*
Husband's age (y)	35±5.6	34.5±5.9	0.737*
Educational level	Lower than high school	19(55.9)	22(64.7)
	High school diploma	11(32.4)	9(26.5)
	Academic	4(11.8)	3(8.8)
Occupation	Housewife	33(97.1)	34(100)
	Employed	1(2.9)	0(0)
Monthly income	Favorable	14(41.2)	16(47.1)
	Not favorable	20(58.8)	18(52.9)
Number of children	1	15(44.1)	10(29.4)
	2	14(41.2)	18(52.9)
	≥3	5(14.7)	6(17.6)
Gestational age (wk)	38.33±0.76	38.29±0.57	0.777*
Type of anesthesia	General anesthesia	1(2.9)	1(2.9)
	Spinal anesthesia	33(97.1)	33(97.1)
Systolic blood pressure (mm Hg)	110.01±7.3	108.7±6.7	0.390*
Diastolic blood pressure (mm Hg)	70.1±7.5	70.4±6.1	0.860*
Pulse	84.3±5.6	82.4±4.4	0.130*
Temperature (°C)	36.1±2.7	36.6±0.6	0.341*
Breathing rate	19.0±1.1	19.1±1.1	0.743*

*The t-test, **The chi-square test.

day was significantly higher than the baseline (P=0.001), and the 10th-day (P=0.002) score, but no statistically significant difference was found in the mean state anxiety between the baseline and 10th-day scores (P=0.99).

Analysis of covariance was used to compare the mean scores of state anxiety between the control and intervention groups 3 and 10 days after auriculotherapy (Table 4). The results showed that, on the 3rd and 10th day, after controlling the pre-test scores, the adjusted mean of the state anxiety in the intervention group was significantly lower than in the control group (P=0.001). The effect of time on the state anxiety score was significant in both groups. However, the anxiety score decreased slowly in the intervention group from baseline to day 3; however, this

decrease was not statistically significant. The state anxiety in this group dropped from day 3 to day 10 (P=0.001). The mean state anxiety score in the control group increased from the baseline to day 3. The decrease from the 3rd to the 10th day was not significant (Figure 3).

The effect of time on trait anxiety score in both groups was significant (P=0.001). However, no significant difference was observed in the intervention group from baseline to day 3. In this group, from the 3rd to the 10th day, there was a rapid decrease in the trait anxiety score. In the control group, this slope increased from the 3rd to the 10th day. These changes show the obvious difference between the intervention and control groups (Figure 4).

Table 2. Mean pre-test scores of state anxiety and trait anxiety in two groups

Variables	Group	Mean±SD	Mean Differences 95% CI (Lower-Upper)	P*	Cohen's d
State anxiety	Control	38.1±11.4	-0.03 (-4.5-4.5)	0.990	0.003
	Intervention	28.1±6.7			
Trait anxiety	Control	40.2±13.1	-3.9 (-9.1-1.4)	0.147	0.356
	Intervention	36.3±8.1			

*The t-test.

Table 3. Mean scores of state anxiety during intervention in two groups

State Anxiety	Control (n=34)	Intervention (n=34)
Baseline	38.1±11.4	38.1±6.7
Day 3	40.6±10.6	36.9±6.0
Day 10	38.6±11.0	27.9±4.9
F*	F _(2,66) =10.92 2=0.249	F _(2,66) =159.52 η ² =0.829
Pairwise comparison (Bonferroni post hoc test)	Baseline < day 3; (P=0.001) Day 10< day 3; (P=0.001) Day 10=Baseline; (P=0.99)	Day 10< baseline; (P=0.167) Day 10< day 3; (P=0.001) Day 3< baseline (P=0.001)

*Repeated measures ANOVA

4. Discussion

This study aimed to examine the effect of auriculotherapy on the anxiety of hospitalized women following cesarean section. The results showed that the mean scores of state anxiety decreased slightly from baseline to day 3 after the intervention, but it was significant. However, it decreased significantly from day 3 to day 10 after the intervention. In the control group, the state anxiety increased from baseline to the third day; however, from this day to the 10th day after the intervention, there was a decrease, but it was not significant. Auriculotherapy is a technique in which the ear is subjected to activating acupuncture points connected to

the meridians in the body. Two theories of gate control and biochemical mechanisms have been proposed for it. According to the gate theory, impulses from acupressure reach the brain four times faster than painful nerve stimuli. When these impulses continue to be transmitted to the brain and reach the brain, the neural gates are closed, and thus, the annoying stimuli are transmitted at a slower speed. Based on the biochemical mechanism, the effect is due to the release of oxytocin and endorphin hormones after stimulation of acupuncture points [29, 30]. Reduced cortisol hormone and metabolism acceleration by acupressure can minimize muscle stiffness and cause relaxation [31].

Table 4. Adjusted mean scores of state anxiety after the intervention in two groups

State Anxiety	Mean±SD		95% CI (Lower-Upper)	ANCOVA		
	Control (n=34)	Intervention (n=34)		F _(1,65)	P	η ²
Baseline	38.1±11.4	38.1±6.7	-	-	-	-
Day 3	40.6±10.6	36.9±6.0	-3.7(-5.2 to 2.2)	23.66	0.001	0.267
Day 10	38.6±11.00	27.9±4.9	-10.6 (-12.2 to 9.0)	180.08	0.001	0.735

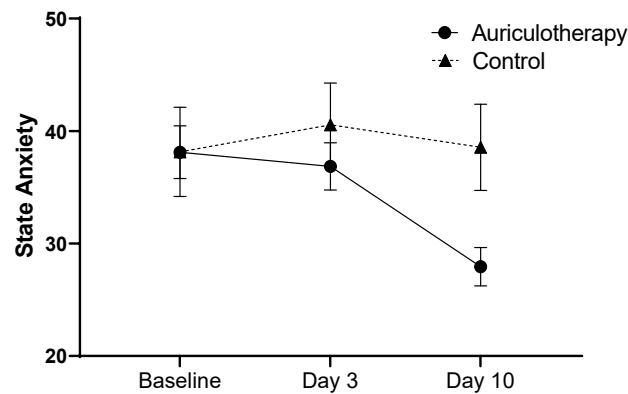


Figure 3. Comparing the state anxiety scores before and after the intervention in the study groups

The mean trait anxiety scores of the intervention group did not differ significantly from baseline to day 3 after the intervention. Still, it decreased significantly from day 3 to day 10 after the intervention. In the control group, there was no significant difference from baseline to day 3 after the intervention, but it increased significantly from day 3 to day 10. The nature of trait anxiety compared to state anxiety may be the reason for this result. i.e. trait anxiety, which is underlying anxiety and a chronic response to the individual's situation, is probably influenced by the stimulus with a delay compared to state anxiety. Kuo [32], in a study using acupressure at one point (Shen men) twice a day, for 3 minutes, reported that the anxiety scores of the intervention group were significantly lower than that of the control group on day 1 to day 4 after the intervention. This finding is consistent with our results. In Mousavi et al.'s study [18], in which auriculotherapy was performed once on the ear 2 hours after cesarean section, the mean anxiety score showed no significant difference one hour after the intervention. Our finding is not in agreement with their results. In their study, the anxiety score decreased two hours after the intervention, but it was not significant. The discrepancy may be related to the difference

in the number of intervention sessions. In the study, auriculotherapy was done only one time.

In contrast, in the present study, the intervention was conducted with many seeds in 6 points, related to anxiety and relaxation for a longer period. In addition, 2 or 3 hours after the cesarean section, mothers may still be affected by the anxiety related to pregnancy or the surgery. In the present study, this issue was considered, and intervention was done 4 hours after the surgery so that the mother be calm and the baby would be breastfed. Moreover, it was conducted with less congestion and a quiet environment. In the present study, the increase in state anxiety on the third day in the control group may be due to environmental factors when the mothers are discharged from the hospital.

Jouya [33] conducted a study on the effect of auriculotherapy by Vaccaria seeds on Shen men, relaxation, endocrine, and tranquilizer points for 3 days before colposcopy (3 times a day, each for 1 minute) in women. Their results showed that the anxiety score changed significantly after the intervention compared to the pre-intervention score. Abadi et al. [34] also reported a significant decrease in anxiety scores after the inter-

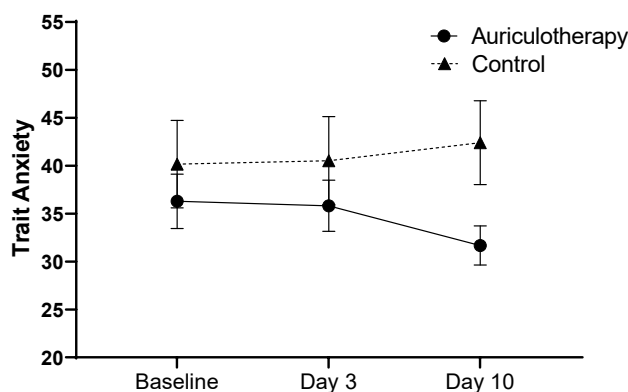


Figure 4. Comparing the trait anxiety scores before and after the intervention in the study groups

vention. Our results are consistent with their results. However, the results of Bang [24], who conducted auriculotherapy with Vaccaria seeds twice a day, do not align with our findings. The reason is the difference in the study population. The level of anxiety and pain in patients with open heart surgery is higher than in cesarean section. Therefore, auriculotherapy should be performed longer, especially in anxiety and pain, because in cases with more pain, the level of anxiety is probably higher. In Boon's study [35], which measured the effect of auriculotherapy on acute anxiety before surgery, no significant change was observed between the test and control groups. Rong [36] also found that auriculotherapy was more effective in treating patients' stress than the usual routine care. Valiani et al. [19] used auriculotherapy twice a week with Vaccaria seeds and assessed the level of anxiety one month after the intervention. They found a significant difference in anxiety between the two groups. According to them, the reason for this effect can be the removal of blockages and unbalanced states of energy in the body, and as a result, improving energy flow, blood circulation, and regulating the release of stress hormones.

One of the limitations of this study was the public and noisy environment of the intervention at baseline, i.e. the first and second day after cesarean section. Moreover, mothers might conduct the intervention without telling the researcher. Hence, a reminder checklist and follow-up phone calls were used to control its effect. It is recommended to conduct further studies to examine the durability of auriculotherapy's effect.

Auriculotherapy is effective in reducing the anxiety of mothers after cesarean section. Therefore, health service providers, especially midwives, can use this complementary medicine to reduce mothers' anxiety.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of [Guilan University of Medical Sciences](#) (Code: IR.GUMS.REC.1400.109) and was registered by the [Iranian Register of Clinical Trials \(IRCT\)](#) (ID: IRCT20210607051505N1). All mothers gave their written informed consent to participate in this study.

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Authors' contributions

Design, conceptualization, resources, and review: Somayeh Sharifi, Maryam Niknami, Zahra Bostani Khalesi and Fateme Haji Hadi; Investigation, initial draft preparation, and editing: Somayeh Sharifi and Maryam Niknami; Data collection: Somayeh Sharifi and Saman Maroufizadeh; Data analysis: Somayeh Sharifi, Maryam Niknami, and Saman Maroufizadeh; Final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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