Complementary Therapies in Clinical Practice 52 (2023) 101762

Contents lists available at ScienceDirect

Complementary Therapies in Clinical Practice

journal homepage: www.elsevier.com/locate/ctcp

Effect of auricular acupressure on postpartum blues: A randomized sham controlled trial

Zainab Alimoradi [a,*], Somayeh Asgari [b], Sanaz Barghamadi [b], Hamideh Hajnasiri [a], Terry Oleson [c], Mark D. Griffiths [d]

[a] Social Determinants of Health Research Center, Research Institute for Prevention of Non-Communicable Diseases, Qasvin University of Medical Sciences, Qasvin, Iran
[b] Qasvin University of Medical Sciences, Qasvin, Iran
[c] Emperor's College of Traditional Oriental Medicine, Santa Monica, CA, USA
[d] International Gaming Research Unit, Psychology Department, Nottingham Trent University, Nottingham, UK

ARTICLE INFO

Keywords:
Auricular acupressure
Postpartum blues
Depression
Fatigue
Maternal neonatal attachment

ABSTRACT

Aim: To investigate the effect of auricular acupressure on the severity of postpartum blues.
Methods: A randomized sham controlled trial was conducted from February to November 2021, with 74 participants who were randomly allocated into two groups of either routine care + auricular acupressure (n = 37), or routine care + sham control (n = 37). Vacaria seeds with special non-latex adhesives were used to perform auricular acupressure on seven ear acupoints. There were two intervention sessions with an interval of five days. In the sham group, special non-latex adhesives without vacaria seeds were attached in the same acupoints as the intervention group. Severity of postpartum blues, fatigue, maternal-infant attachment, and postpartum depression were assessed.
Results: Auricular acupressure was associated with significant effect in reduction of postpartum blues on 10th and 15th days after childbirth (SMD = −2.77 and −2.15 respectively), postpartum depression on the 21st day after childbirth (SMD = −0.74), and maternal fatigue on 10th, 15th and 21st days after childbirth (SMD = −2.07, −1.30 and −1.32, respectively). Also, maternal-infant attachment was increased significantly on the 21st day after childbirth (SMD = 1.95).
Conclusion: Auricular acupressure was effective in reducing postpartum blues and depression, reducing maternal fatigue, and increasing maternal-infant attachment in the short-term after childbirth.
Trial registration: Registered prospectively in Iranian Registry of Clinical Trials (ID: IRCT20180218038789N2).

1 Introduction

Postpartum blues refers to mood swings experienced in the first days after childbirth [1]. It usually begin three to four days after childbirth with maximum symptoms in the first five days, which often subside by the tenth day [2]. Symptoms include persistent crying, emotional instability, fatigue, temporary anxiety and confusion, sleep and appetite disorders, anxiety, and irritability [1]. The prevalence of postpartum blues varies from 30% to 85% in different countries [3, 4]. It is usually a self-limiting condition which improves with social and family support (and without medication). However, if it lasts more than two weeks, more severe mental disorders, especially postpartum depression, can occur among 20% of individuals with postpartum blues [4]. Postpartum depression, the second most common psychological problem in the postpartum period, occurs often within the first three months after childbirth [5]. Postpartum depression includes depressed mood, sleep and appetite disorders, low energy, anxiety, suicidal ideation, feelings of guilt and inadequacy in caring for the baby, and not paying attention to the well-being and safety of the baby [6].

Mothers with postpartum blues, postpartum depression or other mental health illness experiences can have trouble in caring for their child and can have attachment insecurity regarding their children [7]. Consequently, postpartum blues can become a psychological problem (e.g. postnatal depression) if ignored [8]. While postpartum blues does not have any specific medical treatment, it should be monitored in relation to the occurrence of the diagnostic criteria of postpartum depression [9]. The administering of antidepressants is the conventional medical treatment for postnatal depression, although there is the important concern regarding transition of metabolites to the mother's milk during breastfeeding [10]. Some mothers do not

accept conventional medical interventions due to their maternal side-effects (e.g. dry mouth, palpitations, and possibility of excretion to their milk) while breastfeeding their infants [11]. Therefore, complementary therapies with no chance of chemical secretion in mothers' milk, are more acceptable therapeutic options for this group of women [12]. There are several ways to reduce postnatal mood disorders and postpartum depression, including counseling, self-care, relaxation, music therapy, herbal medicine, acupuncture, and acupressure [2, 4].

Auricular acupressure, one form of complementary and alternative medicine, uses the ear as a target point of acupressure [13]. As one of the body's microsystems, the ear has connection to different body organs and their functions, and can be used to diagnose, treat, and prevent diseases [14]. The stimulation of acupoints increases natural biochemicals for pain relief in serum and cerebrospinal fluid neurotransmitters such as enkephalins and monoamines [15]. Therefore, acupressure slowly restores the body to a harmonious state and helps to treat disease and health-related problems [16]. Also, by stimulating the ear points using acupressure, the benefits can be enjoyed for days and even weeks [17].

The promising effect of auricular acupressure on depression has been studied in different target groups including outpatient nurses [14], patients with post-stroke depression [15], older adults in long-term care institution [16, 17], nursing students experiencing sleep disturbances [18], and breast cancer patients [19]. In an integrative review, Hmwe et al. reported evidence from 19 studies that acupressure can be beneficial for older people who suffer from depression [20].

Very few studies have been conducted on the effects of auricular acupressure on postpartum depression. A 2018 review and meta-analysis reported that three clinical trials compared the effects of acupuncture with fluoxetine and found the effect of acupuncture can be the same as fluoxetine in improving postpartum depression [25]. Kuo et al. [17] reported significantly lower anxiety, fatigue, and cortisol levels after auricular acupressure. Also, Kim et al reported positive effect of auricular acupressure in decreasing depression and fatigue among early postpartum mothers [26]. However, Mousavi et al. [27] found no effect for auriculotherapy on anxiety after cesarean section. One of the weaknesses of Mousavi et al.'s study was the short-term follow-up after cesarean section (just two hours later). To the best of the present authors' knowledge, the effect of auricular acupressure on postpartum blues has not been previously investigated. Postpartum blues is a preliminary situation which can be worsen if ignored and amy lead to postpartum depression. Trying to eliminate postpartum blues in a timely way may prevent the onset of postpartum depression. Therefore, the present study investigated the effect of auricular acupressure on the severity of postpartum blues.

2 Methods

2.1 Design and setting

The present study was a randomized clinical sham controlled trial. The study setting was Kowsar Hospital in Qazvin city. Kowsar Medical Training Center is a specialized women's hospital in Qazvin province located in Qazvin city with 151 active beds. This hospital provides specialized and super-specialized services in gynecology, maternity, infertility, and newborns.

2.2 *Participants*

Eligibility criteria were: (i) giving birth to a single full-term (38 to 40 weeks of gestation) baby, (ii) having a normal ear without lesions, sores and pain in the earlobe, and (iii) availability during the study period. The exclusion criteria were (i) having complications in pregnancy and postpartum (preterm delivery, preeclampsia, gestational diabetes, infants in need of special care, etc.), (ii) having a history of chronic mental and physical illness (self-report and review

of personal file), (iii) substance abuse in individual or spouse, (iv) having a history of using acupressure in the past three months, and (v) experiencing stressful events (such as the loss of a loved one) in the past three months.

2.3 Sampling procedure

Participants were recruited utilizing convenience sampling from the postpartum ward. Eligible individuals were assigned to study groups of intervention with auricular therapy or intervention by sham method randomly.

2.4 Random allocation

Random allocation was generated using a balanced block randomization with blocks size of four. Each group was assigned a letter (A: intervention group by acupressure, B: sham group). Then, the allocation sequence was generated using online methods (https://www.randomizer.org/).

2.5 Concealment of allocation sequence

When allocation sequence was prepared, the sequence was written down on paper and placed in opaque sealed envelopes. The envelopes were numbered sequentially. In the same way, the questionnaires were coded. Therefore, for the mother who received Intervention Code 1, a questionnaire with the same code was completed.

2.6 Sample size estimation

Sample size was estimated based on previous study considering the mean score (and standard deviation) on the Postpartum Blues Questionnaire after intervention in the two intervention and comparison groups of 1.4 (SD=2.29) and 3.14 (SD=3.53), respectively [28]. Therefore, considering $\alpha = 0.05$ (95% confidence) and $\beta = 0.2$ (80% power) estimating the sample volume, taking into account 35% of attrition, it was estimated that 37 individuals would be needed for each group.

2.7 Procedure

After obtaining the necessary permits, one of the research team members came to the trial environment and identified eligible individuals. After enrollment, participants were randomly assigned to auricular acupressure or sham control groups based on the allocation sequence. Before the intervention, the participants' demographic and reproductive characteristics were collected. Following this, auricular acupressure and sham auricular acupressure was performed in addition to routine postpartum counseling and care as outlined below.

2.7.1 Auricular acupressure

After cleaning both outer earlobes with alcohol, Vacaria seeds with special non-latex adhesives were applied to five points of the left ear (i.e., Master Endocrine, Shenman, Zero, gonadotropin, master cerebral) and two points of the right ear (i.e., thalamic and antidepressant). Ear acupoints were selected based on literature review [29-31] and an expert opinion who was one of the research team members (TO). There were two intervention sessions with an interval of five days (three days of Vacaria seeds, then one day without seeds to rest, and then reattachment of the seeds for the next five days). Seeds were inserted on first day after childbirth before hospital discharge. The next intervention session was on the fifth day because the mothers come back for their first postnatal visit at that point. Participants were asked to hold the seeds for five days, during which time they had to press each acupoint for 20 seconds three times a day [29]. During study time if the seeds were replaced or removed, participants were asked to inform the

researcher to reattach the seeds at the earliest time within one day. Figure 1 shows the location of the Vacaria seeds.

2.7.2 Rationale in choosing acupoints

Master endocrine, shen men, zero, gonadotropin, master cerebral, thalamic and antidepressant points were all selected acupoints in the present study. The master endocrine point brings balance to the endocrine hormones and such stimulation improves hypersensitivity [29, 32]. Shen men stimulation soothes the mind and facilitates achieving a balanced psychological state by reducing pain, stress, anxiety, tension, depression, restlessness, insomnia, and hypersensitivity [29, 32]. Point zero is considered as the geometrical center of auricle. Stimulation of point zero can restore balance to the whole body by balancing the energy, body hormones, and brain function [29, 32]. The gonadotropin acupoint regulates the secretion of sex hormones, improving fatigue, and depression [29, 32]. Stimulation of master the cerebral acupoint can improve the function of the brain's prefrontal lobe and alleviate the symptoms including anxiety, nervousness, fear, worry, insomnia [29, 32]. Stimulation of the thalamic point balances the function of the hypothalamus and the thalamus and improves most of the acute or chronic pain disorders. It is used in the treatment of some psychological problems (e.g. depression, and anxiety) [29, 32].

2.7.3 Sham intervention

In the comparison group, the same acupoints as the intervention group were attached with special non-latex adhesives but without the Vacaria seeds. Using adhesive patches without the pellet or seed on the same ear acupoints as the experimental group is a common sham control for auricular acupressure interventions [33].

2.7.3. Treatment fidelity

Intervention sessions were conducted by a midwife working in the postpartum ward of the selected hospital (which was the study setting). She was also a member of the research team She underwent an acupressure training course under the supervision of a traditional medicine specialist sponsored by the Iranian Scientific Association of Midwifery. After confirming the accuracy of the implementation method, the intervention was performed on the participants. In addition, to ensure the correct implementation of the techniques, the first 10 interventions were performed under the supervision of the traditional medicine specialist.

2.7.5 Blinding

The present study was triple-blinded. The control group received the sham intervention with same protocol as the intervention group. Therefore, participants were not informed what group they are in. Moreover, the outcome assessor and data analyst were also blinded.

2.8 Variables and measures

The main outcome variable was the severity of postpartum blues. Secondary outcome variables included fatigue, maternal-infant attachment, and postpartum depression. It should also be noted that selected secondary variables are related to postpartum blues (as explained in the Introduction). Mothers with postpartum blues feel more fatigue, have improper attachment to their neonate, and have increased chances of postpartum depression. Therefore, these variables were assessed to examine the effect of auricular acupressure on these secondary outcomes.

Demographic and reproductive characteristics: This checklist included information regarding age, level of education, place of residence, occupation, duration of marriage, economic status,

number of pregnancies, desire to conceive, type of delivery, neonate gender, and weight of baby at birth.

Postpartum Blues Questionnaire (PBQ): The PBQ developed by Stein [34], comprises 13 questions. The first eight questions are answered on a four-point scale from 0 (*never*) to 3 (*always*) and the final five questions are answered either yes or no (yes answer scored 1). The overall score ranges from 0 to 26. Individuals who score 8 or higher are classed as having postpartum blues [34]. The psychometric properties of the Persian version have been shown to be good [3]. Intraclass correlation coefficient of three measurements (i.e., 5, 10 and 15 days after childbirth) was 0.70 in present study, showing good internal consistency.

Edinburgh Postpartum Depression Scale (EPDS): The EPDS comprises 10 items designed to diagnose postpartum depression. Items are rated on a four-point scale from 0 (*Yes, all the time*) to 3 (*No, not at all*). The overall scores range from 0 and 30. A score of 12 or higher is considered to be postpartum depression [35]. The psychometric properties of the Persian version have been shown to be good [36]. The scale reliability using Cronbach alpha was 0.90 in present study.

Iowa Fatigue Scale (IFS): The IFS comprises 13 items. It has four subscales of cognitive symptoms (Items 3, 5, 9, and 11), general fatigue (Items 1 and 6), reduced energy (Items 2, 7, and 10) and reduced efficiency and effectiveness (Items 4 and 8). Items are rated in a five-point scale from 1 (*not at all*) to 5 (*very high*). Items 2, 4, 7, 10, and 11 are reverse scored. The overall score ranges from 13 to 65 with higher scores indicating greater fatigue [37]. The psychometric properties of original version [37] and Persian version [38] have been shown to be good. The intraclass correlation coefficient was 0.92 in present study across the four measurement periods, showing excellent internal consistency.

Maternal-Infant Attachment Scale (MIAS): The MIAS developed by Müller was based on theory of attachment and comprises 26 items. Items are rated on a four-point scale from 1 (*almost never*) to 4 (*almost always*). The overall scores range from 26 to 104. Higher scores indicate higher degree of maternal attachment to her infant. The psychometric properties of original version [39] and Persian version [40] have been shown to be good. Intraclass correlation coefficient of four measurements was 0.69 in present study, showing good internal consistency.

2.9 Measurement time points

Postpartum blues was assessed at three time points (Days 5, 10 and 15 days after childbirth). The Edinburgh Postpartum Depression Scale was completed on Day 21 after childbirth. Fatigue and mother-infant attachment were assessed at four time points on Days 5, 10, 15 and 21 after childbirth. All measures were completed by telephone interview.

2.10 Ethical considerations

The study protocol was reviewed and approved by the Institutional Review Board and the Ethics Committee. The trial was also registered prospectively. Written informed consent was provided by all the participants.

2.11 Statistical analysis

SPSS software version 24 was used for data analysis. Balanced distribution of baseline characteristics were assessed based on the method proposed by Imbens and Rubin [41]. Consequently, continuous variables were considered balanced among study groups if the

standardized mean difference was less than 0.25, and for categorical variables, a difference less than 10% in frequency was considered balanced. The mean scores of outcome variables were analyzed using repeated measurements analysis of variance-covariance (RM ANOVA-ANCOVA). The prerequisites for analysis of variance were examined for repeated measurements, including tests of normal distribution (supported based on Kolmogorov-Smirnov test with $p>0.05$), sphericity, and homogeneity of variance. Due to the lack of sphericity requirement, the results were reported with Greenhouse-Geisser correction. The measure of effect was assessed based on the mean difference and the standardized mean difference based on Cohen's *d* (interpreted as 0.2-0.5 for a small effect size; 0.5-0.8 for a medium effect size; and greater than 0.8 for a large effect size) [42]. Partial eta squared was the other effect size used to assess the measure of effect in current intervention. Partial eta squared is interpreted as trivial when <0.010; small effect when between 0.010-0.059; medium effect when between 0.060-0.139 and large effect when ≥ 0.140 [43]. The significance level of all tests was $p<0.05$.

3 Results

In the study, 74 individuals were randomly assigned to auricular acupressure or sham control groups (37 individuals in each group). Due to the COVID-19 pandemic during the sampling period, 10 individuals in the control group and 11 individuals in the intervention group withdrew from the study due to the difficulty of attending the second visit. Baseline characteristics was not significantly different among those who dropped out and those who stayed until the end of the study. Figure 2 shows the CONSORT diagram for the study process.

Table 1 shows the status of baseline characteristics of participants based on study groups. The number of pregnancies, fetal weight, neonate gender, mother's level of education, mother's desire for pregnancy, and economic status appeared to have imbalanced distribution between the two groups. Therefore, these variables were controlled as covariates in subsequent analyses. Table 2 present the effect of intervention on study variables including postpartum blues and depression, fatigue and mother-infant attachment.

The mean score of postpartum blues on the fifth day after childbirth was not significantly different in between the two groups. However, a significant decrease in the mean score of postpartum blues was observed on Days 10 and 15 postpartum in the intervention group compared to the sham group. Also, the mean scores of postpartum depression on the 21st postpartum day was significantly different between the two groups ($p=0.02$).

The mean fatigue score was not significantly different on the fifth day after childbirth between the two groups. However, there was a significant decrease in the mean fatigue score on Days 10, 15 and 21 after childbirth in the intervention group compared to the sham group.

The findings of the study did not show a significant difference on Days 5, 10 and 15 after childbirth between the mean scores of mother-infant attachment between the two groups. However, the two groups had a significant difference on Day 21 after childbirth and the intervention group with auricular acupressure had a higher mean score on the attachment scale than the sham group.

3.6 Side effects

During the intervention and follow-up, no side effects were reported by any of the participants regarding the auricular acupressure intervention.

4 Discussion

Based on a comprehensive literature review, the present study is one of the first studies to investigate the effect of auricular acupressure compared to sham on postpartum blues and depression. Findings of the study showed that auricular acupressure compared to sham was associated with a considerable and significant effect in reduction of postpartum blues on Days 10 and 15 after childbirth and reduction in postpartum depression on Day 21 after childbirth. In addition, the intervention significantly reduced maternal fatigue on Days 10, 15, and 21 after childbirth. Also, maternal-infant attachment was significantly increased in the intervention group compared to the sham control group on Day 21 after childbirth.

Acupressure can affect the nervous state of the brain by facilitating the release of endorphins. When endorphins are released, opioid receptors are stimulated, and these are able to relax and reduce stress and anxiety among individuals [44]. In addition, acupressure can calm heart rate, regulate energy flow, balance energy, lower blood pressure, and reduce anxiety. This is done by stimulating specific points using pressure that can relax small nerve fibers, and send stimuli and impulses to the spinal cord, midbrain, pituitary, and hypothalamus [45]. The findings of the present study showed the positive effect of auricular acupressure on reducing postpartum blues and depression. In line with the present study, Kim et al. [26], Kuo et al. [17] and Bohari et al. [46] also reported that auricular acupressure was associated with a significant reduction in depression in postpartum mothers. However, Mousavi et al. [27] and Ghaemmaghami et al. [47] reported that auricular acupressure was not effective in reducing maternal post-cesarean anxiety and postpartum depression. The reason for this inconsistency might be due to (i) selection of acupoints in the ear, (ii) different stimulation time, (iii) different follow-up time points, and (iv) measurement tools used. Acupoints in the present study included seven points (Master Endocrine, Shenman, Zero, gonadotropin, master cerebral, thalamic and antidepressant points) that were stimulated in two five-day periods using Vacaria seeds.

Mousavi et al. performed limited auricular acupressure for 20 minutes, two to three hours after cesarean section on five points (shen men, subcortex, uterus, pelvis, and abdomen) [27]. Ghaemmaghami et al. examined the effect of auricular acupressure during labor pain (twice) and the first six hours after childbirth (once) for a total of 30 minutes on five points (shen men, zero, brain, brain stem, thalamic) [47]. Therefore, different acupoint selection and auricular acupressure pattern might be a potential source of this inconsistency. In the present study, more acupoints were used. In addition, the specific point of anti-depression, which is an important acupoint for improving the psychological state, was also included. The duration of auricular acupressure in the present study was 10 days and therefore there was ample opportunity for physiological changes associated with stimulation of pressure points. Another difference between the present study and that of Ghaemmaghami et al. [47] was the choice of measures to assess depression. In the present study, specific instruments were used to assess postpartum blues and depression, while Ghaemmaghami et al. [47] used the Beck Depression Inventory [48] to assess outcomes, and both of them are general measures used to assess anxiety and depression.

Another finding of the present study was the significant effect of auricular acupressure in reducing maternal fatigue during the postpartum period, which was consistent with the findings of previous studies by Kim et al. [26] and Kuo et al. [17]. In addition, the positive effect of auricular therapy has been reported in the reduction of fatigue among breast cancer patients [49] and hemodialysis patients [50]. In the present study, maternal-infant attachment was significantly higher in the intervention group compared to the sham control group on Day 21 after childbirth. The effect of auricular acupressure on maternal-infant attachment has not been

investigated previously. However, consistent with these findings, body acupressure at acupoints GB-21 and SP-6 have been shown to increase maternal-fetal attachment [51].

4.1 Limitations

The present study is among the first to investigate the effect of auricular acupressure on postpartum blues. The strengths of the present study included using a randomized clinical trial approach with a simultaneous sham control group and four follow-up time points, having participants with normal vaginal childbirth as well as cesarean section, and different childbirth histories (i.e., first-time mothers and those who had children previously). It could provide a better understanding of changes in psychological state of postpartum mothers during first 21 days following childbirth. However, the interpretation of the study results should consider the following limitations: using self-report scales to evaluate the outcome variables, as well as not examining variables such as the marital relationship and partner postpartum support.

5 Conclusion

Auricular acupressure appears to be an effective intervention in reducing postpartum blues and depression, reducing maternal fatigue, and increasing maternal-neonatal attachment. Due to its simplicity, cheapness, safety, and acceptability for patients, it can be used in maternal care in the postpartum period alongside routine care.

References

1. Grussu P, Quatraro RM. Maternity blues in Italian primipara women: symptoms and mood states in the first fifteen days after childbirth. Health Care For Women International. 2013;34(7):556-76.
2. Mol MB, Solomon SRJ. A study to evaluate the effectiveness of music therapy on postpartum blues among postnatal mothers admitted at selected hospitals in Kanyakumari district. Asian Journal of Nursing Education and Research. 2019;9(1):99-101.
3. Kariman N, Karimi S, Shiadeh MN, Shams J, Nasiri N. The relation between maternity blues and postpartum anxiety among iranian pregnant women. Biosci Biotechnol Res Asia. 2016;13(1):429-434.
4. Thitipitchayanant K, Somrongthong R, Kumar R, Kanchanakharn N. Effectiveness of self-empowerment-affirmation-relaxation (Self-EAR) program for postpartum blues mothers: a randomize controlled trial. Pakistan Journal of Medical Sciences. 2018;34(6):1488-93.
5. Hutchens BF, Kearney J. Risk factors for postpartum depression: an umbrella review. Journal of Midwifery & Women's Health. 2020;65(1):96-108.
6. Henshaw C. Mood disturbance in the early puerperium: a review. Archives of Women's Mental Health. 2003;6(2):s33-s42.
7. Dhanyabad A. Baby blues, post partum depression and its effect on babies. International Journal of Nursing Education and Research. 2019;7(3):418-20.
8. Buttner MM, Brock RL, O'Hara MW. Patterns of women′ s mood after delivery: a growth curve analysis. Journal of Affective Disorders. 2015;174:201-8.
9. Balaram K, Marwaha R. Postpartum blues. StatPearls Publishing; 2022.
10. Brown JVE, Wilson CA, Ayre K, Robertson L, South E, Molyneaux E, et al. Antidepressant treatment for postnatal depression. Cochrane Database of Systematic Reviews. 2021(2):CD013560.
11. Frieder A, Fersh M, Hainline R, Deligiannidis KM. Pharmacotherapy of postpartum depression: current approaches and novel drug development. CNS Drugs. 2019;33:265-82.
12. Mantle F. The role of alternative medicine in treating postnatal depression. British Journal of Community Nursing. 2001;6(7):363-8.

13. Tan J-Y, Molassiotis A, Wang T, Suen LK. Current evidence on auricular therapy for chemotherapy-induced nausea and vomiting in cancer patients: a systematic review of randomized controlled trials. Evidence-Based Complementary and Alternative Medicine. 2014;Article ID 430796 1-6.
14. Vieira A, Reis AM, Matos LC, Machado J, Moreira A. Does auriculotherapy have therapeutic effectiveness? An overview of systematic reviews. Complementary Therapies in Clinical Practice. 2018;33:61-70.
15. Gao X-Y, Wang L, Gaischek I, Michenthaler Y, Zhu B, Litscher G. Brain-modulated effects of auricular acupressure on the regulation of autonomic function in healthy volunteers. Evidence-Based Complementary and Alternative Medicine. 2012; 2012:714391
16. Yeh M-L, Chang Y-C, Huang Y-Y, Lee T-Y. A randomized controlled trial of auricular acupressure in heart rate variability and quality of life for hypertension. Complementary Therapies in Medicine. 2015;23(2):200-9.
17. Kuo S-Y, Tsai S-H, Chen S-L, Tzeng Y-L. Auricular acupressure relieves anxiety and fatigue, and reduces cortisol levels in post-caesarean section women: A single-blind, randomised controlled study. International Journal of Nursing Studies. 2016;53:17-26.
18. Lee S-N, Kim B, Park H. The effects of auricular acupressure on stress, anxiety, and depression of outpatient nurses in South Korea. Complementary Therapies in Clinical Practice. 2021;44:101447.
19. Yin X-J, Wang F, Lin G-P, Gong X-L, Yao M-Y. Effects of auricular acupressure on depression in stroke patients: A single-blind randomized controlled trial. Complementary Therapies in Clinical Practice. 2022;48:101596.
20. Tseng Y-T, Chen IH, Lee P-H, Lin P-C. Effects of auricular acupressure on depression and anxiety in older adult residents of long-term care institutions: A randomized clinical trial. Geriatric Nursing. 2021;42(1):205-12.
21. Chang E, Park H. Effects of Auricular Acupressure Therapy on Musculoskeletal Pain, Depression and Sleep of the Elderly in Long-term Care Facilities. jkachn. 2018;29(2):133-42.
22. Chueh K-H, Chang C-C, Yeh M-L. Effects of auricular acupressure on sleep quality, anxiety, and depressed mood in RN-BSN students with sleep disturbance. Journal of Nursing Research. 2018;26(1):10-7.
23. Xiao B, Liu Z. Efficacy on depression in breast cancer treated with acupuncture and auricular acupressure. Zhongguo Zhen Jiu (Chinese Acupuncture & Moxibustion). 2014;34(10):956-60.
24. Hmwe NTT, Browne G, Mollart L, Allanson V, Chan SW-C. An integrative review of acupressure interventions for older people: A focus on sleep quality, depression, anxiety, and agitation. International Journal of Geriatric Psychiatry. 2019;34(3):381-96.
25. Komori A, Arthur D, Radford S, Tan HY, Zheng L, An M, et al. Acupuncture versus antidepressants in the management of postpartum depression: A systematic review. British Journal of Midwifery. 2018;26(10):670-81.
26. Kim SH, Sung KM. The effects of auricular acupressure on depression and fatigue among early postpartum mothers. Journal of East-West Nursing Research. 2019;25(2):91-102.
27. Mousavi FS, Golmakani N, Taghanaki B, Reza H, Saki A, Akhlaghi F. Effects of auriculotherapy on post cesarean anxiety. The Iranian Journal of Obstetrics, Gynecology and Infertility. 2017;20(6):50-60.
28. Shobeiri F, Hajian S, Massoumi Z, Soltanian A. The effect of kangaroo mother care counseling on postpartum blues, a randomized clinical trial. Avicenna Journal of Nursing and Midwifery Care. 2018;26(2):113-9.
29. Oleson T. Auriculotherapy manual: Chinese and western systems of ear acupuncture Churchhill Levingstone. 2014.
30. Nogier R. Auriculotherapy. Thieme; 2008.

31. Rubach A. Principles of ear acupuncture: Microsystem of the auricle. Thieme. 2016.
32. Artioli DP, Tavares ALdF, Bertolini GRF. Auriculotherapy: neurophysiology, points to choose, indications and results on musculoskeletal pain conditions: A systematic review of reviews. Brazilian Journal of Pain. 2019;2:356-61.
33. Zhang CS, Yang AW, Zhang AL, May BH, Xue CC. Sham control methods used in ear-acupuncture/ear-acupressure randomized controlled trials: a systematic review. The Journal of Alternative and Complementary Medicine. 2014;20(3):147-61.
34. Stein GS. The pattern of mental change and body weight change in the first post-partum week. Journal of Psychosomatic Research. 1980;24(3-4):165-71.
35. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. British Journal of Psychiatry. 1987;150(6):782-6.
36. Ahmadi kani Golzar A, GoliZadeh Z. Validation of Edinburgh Postpartum Depression Scale (EPDS) for screening postpartum depression in Iran. Journal of Nursing Education. 2015;3(3):1-10.
37. Hartz A, Bentler S, Watson D. Measuring fatigue severity in primary care patients. Journal of Psychosomatic Research. 2003;54(6):515-21.
38. Hadi N, Khademalhosseini Z, Khademalhosseini M. Comparison of prevalence of fatigue in adult diabetic mellitus patients with healthy population in Shiraz 2010. Shiraz E-Med J. 2012;13(3):1-8.
39. Müller ME. A questionnaire to measure mother-to-infant attachment. Journal of Nursing Measurement. 1994;2(2):129-41.
40. Atashi V, Kohan S, Salehi Z, Salehi K. Maternal-fetal emotional relationship during pregnancy, its related factors and outcomes in Iranian pregnant women: a panel study protocol. Reproductive Health. 2018;15(1):1-7.
41. Imbens GW, Rubin DB. Causal inference in statistics, social, and biomedical sciences: Cambridge University Press; 2015.
42. Fritz CO, Morris PE, Richler JJ. Effect size estimates: current use, calculations, and interpretation. Journal of Experimental Psychology: General. 2012;141(1):2-18.
43. Cohen J. The effect size. Statistical power analysis for the behavioral sciences. Academic Press. 1988
44. Pirhadi M, Valiani M. Assessing effects of BL67 points stimulation on fetal heart rate parameters and fetal movements during nonstress test. Journal of Education and Health Promotion. 2017;6;43.
45. Qu F, Zhang D, Chen L-T, Wang F-F, Pan J-X, Zhu Y-M, et al. Auricular acupressure reduces anxiety levels and improves outcomes of in vitro fertilization: a prospective, randomized and controlled study. Scientific Reports. 2014;4(1):1-7.
46. Bohari NH, As'ad S, Khuzaimah A, Miskad UA, Ahmad M, Bahar B. The effect of acupressure therapy on mothers with postpartum blues. Enfermería Clínica. 2020;30:612-4.
47. Ghaemmaghami M, Vakilian K, Sheikh Ghanbari N, Shabani F, Vahedi M. The effect of auriculotherapy during labor and postpartum on postpartum depression in nulliparous women: a clinical trial study. The Iranian Journal of Obstetrics, Gynecology and Infertility. 2021;24(8):68-74.
48. Gallagher D. The beck depression inventory and older adults: Review of its development and utility. Clinical Gerontologist. 1986;5(1-2):149-63.
49. Yeh CH, Chien L-C, Lin W-C, Bovbjerg DH, Van Londen G. Pilot randomized controlled trial of auricular point acupressure to manage symptom clusters of pain, fatigue, and disturbed sleep in breast cancer patients. Cancer Nursing. 2016;39(5):402-10.
50. Chun Y, Park S. Effects of the auricular acupressure on pruritus and fatigue in hemodialysis patients. Korean Journal of Adult Nursing. 2016;28(4):436-46.

51. Moradi Z, Akbarzadeh M, Moradi P, Toosi M, Hadianfard MJ. The effect of acupressure at GB-21 and SP-6 acupoints on anxiety level and maternal-fetal attachment in primiparous women: a randomized controlled clinical trial. Nursing and Midwifery Studies. 2014;3(3):e19948.

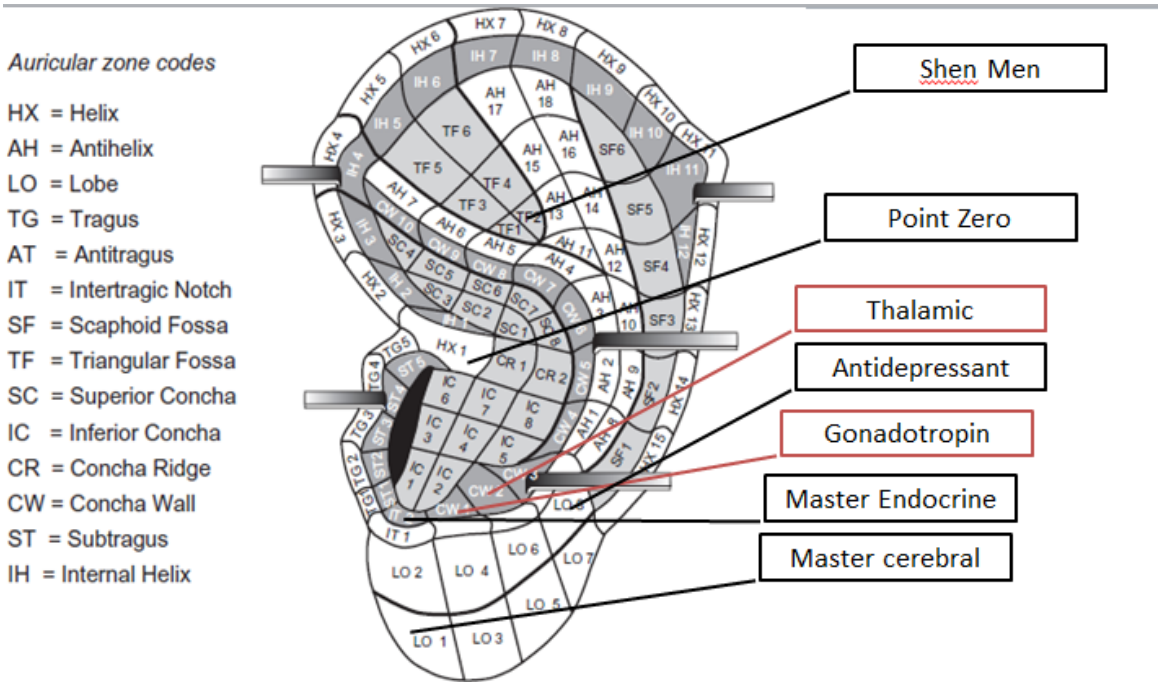


Figure 1. Auricular acupoints for the present study

Figure 2. CONSORT flow diagram

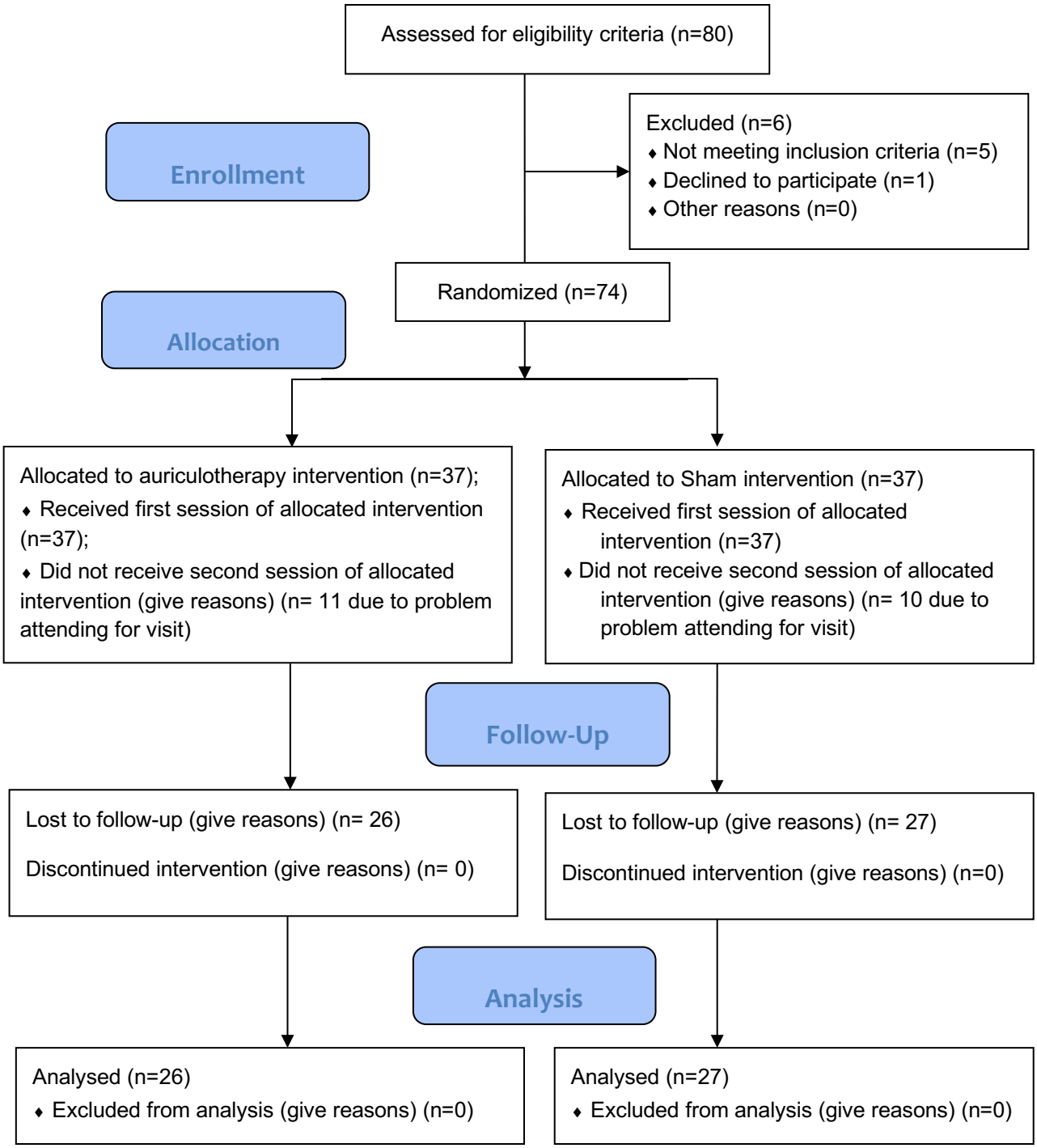
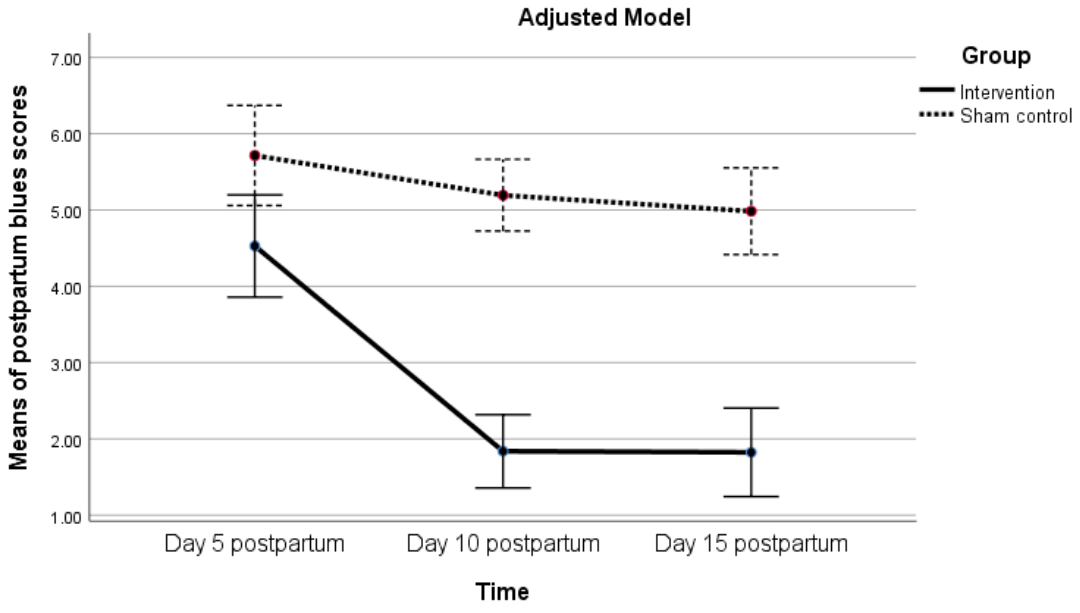


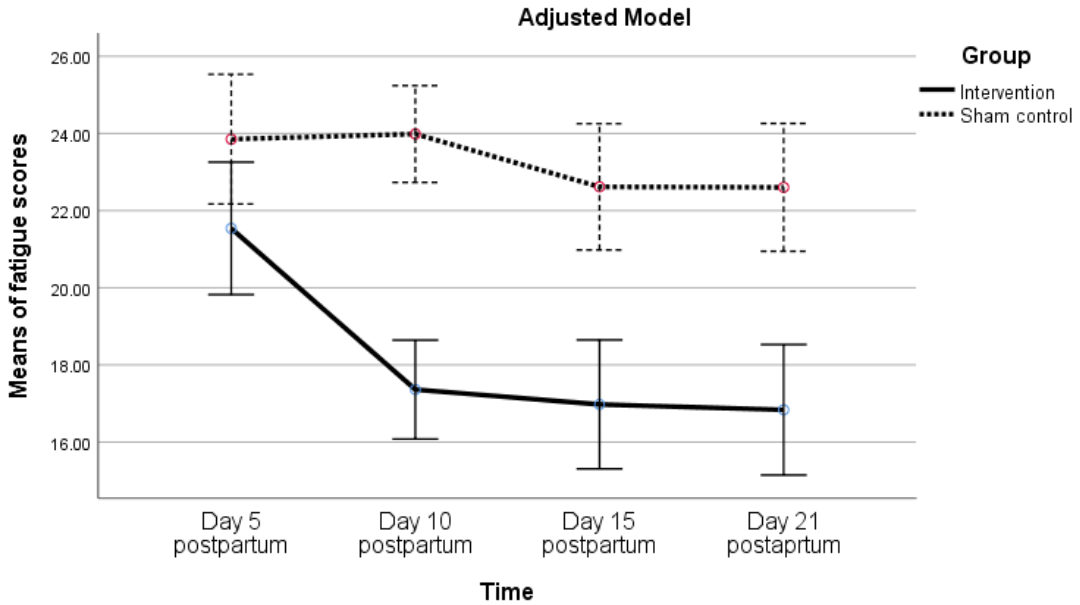
Figure 3- Mean plots related for study variables each measurement time points based on groups



Covariates appearing in the model are Time; Education; Economic Status; Para; Wanted Pregnancy based on mother viewpoint; Neonate gender; Birth weight; Group

Error bars: 95% CI

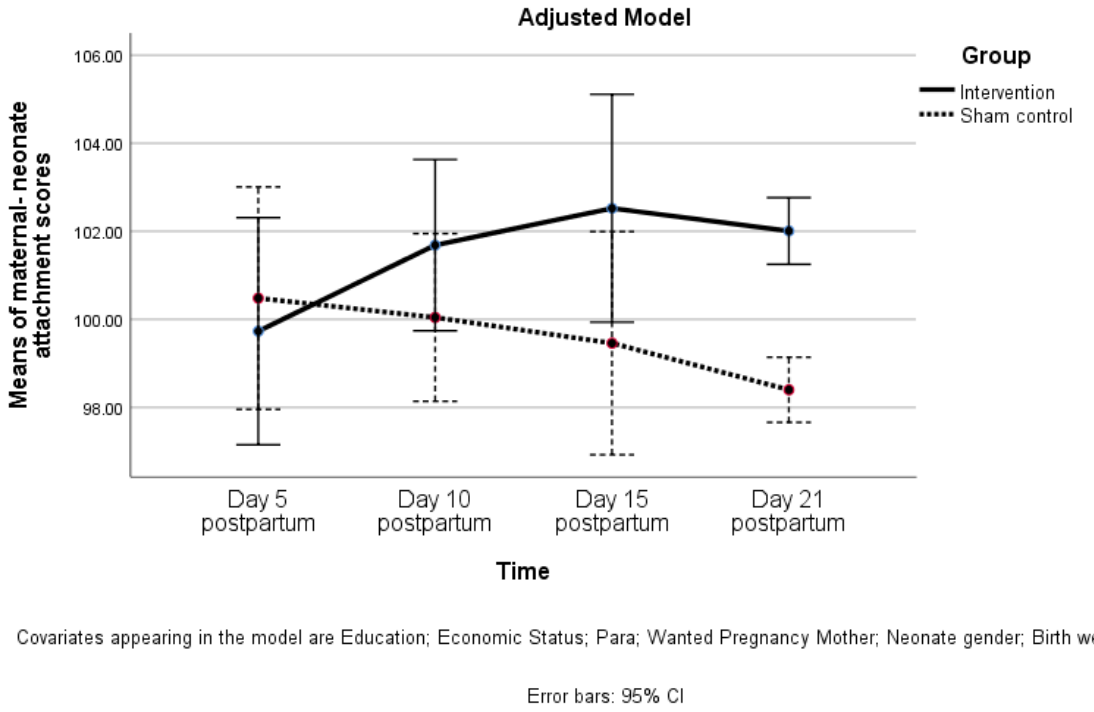
A. to postpartum blues mean scores



Covariates appearing in the model are Time; Education; Economic Status; Para; Wanted Pregnancy based on mother viewpoint; Neonate gender; Birth weight; Group

Error bars: 95% CI

B. Fatigue mean score



C. Maternal – neonate attachment score

Table 1. Distribution of demographic and reproductive characteristics based on study groups

		Intervention (N=26)	Sham Control (N=27)
		Mean (SD)	Mean (SD)
Age (years)		26.50 (6.63)	27.74 (5.65)
Spouse Age (years)		31.92 (6.49)	32.74 (4.21)
Gravid		2.08 (1.06)	2.33 (1.18)
Parity		1.81 (0.94)	1.52 (0.51)
Birth weight (grams)		3067.69 (484.23)	3188.89 (272.91)
		No (%)	No (%)
Education status	Below Diploma	17 (65.4)	11 (40.7)
	Diploma	7 (26.9)	13 (48.1)
	Academic	2 (7.7)	3 (11.1)
Job	Housewife	22 (84.6)	21 (77.8)
	Employed	4 (15.4)	6 (22.2)
Spouse education status	Below Diploma	14 (53.8)	12 (44.4)
	Diploma	10 (38.5)	14 (51.9)
	Academic	2 (7.7)	1 (3.7)
Spouse job	Employed	26 (100)	27 (100)
Economic status	Fair	20 (76.9)	12 (44.4)
	Good	6 (23.1)	15 (55.6)
Mother's willingness for pregnancy	Yes	22 (84.6)	18 (66.7)
	No	4 (15.4)	9 (33.3)
Spouse willingness for pregnancy	Yes	23 (88.5)	21 (77.8)
	No	3 (11.5)	6 (22.2)
Participation in delivery preparation classes	Yes	5 (19.2)	7 (25.9)
	No	21 (80.8)	20 (74.1)
Mode of delivery	NVD	12 (46.2)	15 (55.6)
	NVD + Episiotomy	4 (15.4)	3 (11.1)
	Cesarian section	10 (38.5)	9 (33.3)
Neonate's gender	Female	11 (42.3)	15 (55.6)
	Male	15 (57.7)	12 (44.4)

Table 2. Mean (standard deviation) Study variables at measurement times based on study groups

	Time	Intervention (N=26)	Sham (N=27)	Intervention vs. Sham		Statistical results			
				MD [95% CI]	SMD [95% CI]	effect	F	p	Partial η^2
Postpartum blues	Day 5	4.53 (1.69)	5.71 (1.69)	-1.22 [-2.14; -0.30]	-0.70 [-1.25; -0.14]	Time	0.64	0.53	0.014
	Day 10	1.84 (1.21)	5.19 (1.21)	-3.67 [-4.41; -2.94]	-2.77 [-3.52; -2.02]	Group	47.42	<0.001	0.513
	Day 15	1.82 (1.47)	4.98 (1.47)	-3.37 [-4.21; -2.54]	-2.15 [-2.83; -1.47]	Time*Group	20.96	<0.001	0.318
Postpartum depression	Day 21	4.22 (2.41)	6.01 (2.40)	-1.78 [-3.20; -0.37]	-0.74 [-1.30; -0.19]		6.42	0.02	0.125
Fatigue	Day 5	21.51 (4.27)	23.88 (4.26)	-2.31 [-4.87; 0.24]	-0.56 [-1.10; -0.01]				
	Day 10	17.37 (3.19)	23.97 (3.18)	-6.62 [-8.53; -4.72]	-2.07 [-2.74; -1.41]	Time	0.88	0.40	0.019
	Day 15	17.08 (4.20)	22.52 (4.20)	-5.64 [-8.13; -3.15]	-1.30 [-1.89; -0.70]	Group	33.98	<0.001	0.430
	Day 21	16.92 (4.24)	22.52 (4.23)	-5.77 [-8.29; -3.25]	-1.32 [-1.92; -0.73]	Time*Group	4.24	0.02	0.086
Mother- neonate attachment	Day 5	99.46 (6.63)	100.75 (6.61)	-0.75 [-4.59; 3.09]	-0.20 [-0.74; 0.35]				
	Day 10	101.79 (4.92)	99.94 (5.04)	1.64 [-1.25; 4.54]	0.37 [-0.17; 0.92]	Time	1.80	0.17	0.038
	Day 15	102.58 (6.44)	99.41 (6.43)	3.06 [-0.79; 6.92]	0.49 [-0.05; 1.04]	Group	4.55	0.04	0.09
	Day 21	102.02 (1.85)	98.39 (1.88)	3.61 [2.48; 4.73]	1.95 [1.29; 2.6]	Time*Group	1.74	0.18	0.037

*RM ANOVA-ANCOVA results based on examined covariates: Education, Economic status; Para; Wanted pregnancy based on mother's viewpoint; Neonate gender; Birth weight.