

# The Effect of Auriculotherapy on Nausea, Vomiting, and Anxiety in Patients Undergoing Elective Cesarean Section with Spinal Anesthesia: A Clinical Trial Study

## Abstract

**Background:** Nausea, vomiting, and anxiety are common complications during and after spinal anesthesia. Auriculotherapy as a complementary medicine can be useful for reducing nausea, vomiting, or anxiety. This study was performed to evaluate the effects of auriculotherapy on nausea, vomiting, and anxiety in patients undergoing elective Cesarean Section (CS) with spinal anesthesia. **Materials and Methods:** The present study was a clinical trial study that was performed on 56 pregnant women selected as CS candidates in Ommolbanin Hospital in Mashhad during the years 2016–2017. In the intervention group, 1 h before spinal anesthesia, auricular acupoint stimulation was performed at four points bilaterally, for 20–30 seconds at each point. Evaluations were done by the following questionnaires: State-Trait Anxiety Inventory (STAI), Visual Analog Scale (VAS), and Vomiting Assessment Form. **Results:** The mean anxiety (SD) before the intervention in the intervention group and the control group was 47.88 (8.67) and 47.84 (10.49), respectively, and 4 h after the intervention, it was 40.23 (10.19) and 42.88 (12.18) in the intervention and control groups, respectively. These results were significant in the intervention group ( $p = 0.008$ ). 30–40 min before and 4 h after the surgery, the severity of nausea and vomiting was low in both groups and no significant difference was observed between the two groups during the surgery and in the recovery room ( $p > 0.05$ ). **Conclusions:** According to the results, auriculotherapy could reduce anxiety in CS patients with spinal analgesia. The results also showed that auriculotherapy reduced the severity of nausea and vomiting, but these changes were not significant.

**Keywords:** Anxiety, auriculotherapy, Iran, postoperative nausea and vomiting

## Introduction

Cesarean Section (CS), as a type of delivery, is one of the most common surgeries; and its rate is increasing in both developed and developing countries.<sup>[1]</sup> Over the last years, the CS rate has increased in Iran as well.<sup>[2]</sup> According to the announced statistics in Iran, the rate of CS has increased from 16% in 1985 to 60% in 2013.<sup>[3]</sup> CS not only as a kind of surgery but also as a type of delivery leads to anxiety in mothers. Studies indicate that mothers with Cesarean delivery experience more anxiety than vaginal delivery.<sup>[4,5]</sup> Mothers need mental relaxation for breastfeeding and taking care of their newborns. Therefore, nowadays management and controlling anxiety in CS cases is very important all over the world.<sup>[4]</sup> Spinal anesthesia is commonly used for CS. One of the important complications of patients under spinal

anesthesia is Postoperative Nausea and Vomiting (PONV), which occurs in 50–80% of cases.<sup>[6]</sup> Nausea and vomiting can cause several complications including dehydration, loss of electrolytes, increase bleeding, pain, anxiety, fatigue, and sleep disturbance. In addition, these complications may lead to delays in discharge and dissatisfaction among patients.<sup>[7–9]</sup> Anxiety before surgery is associated with physiological responses such as hypertension and dysrhythmia. Preoperative anxiety leads to a number of problems such as increased postoperative analgesic requirement and autonomic fluctuations. In addition, complications such as increased pain, nausea and vomiting, prolonged recovery, and increased risk of infection occur following anxiety.<sup>[10]</sup>

There are various pharmacological and non-pharmacological methods to control anxiety and PONV in cesarean patients.<sup>[4,8]</sup>

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Studies show that using drugs for reducing anxiety or PONV can cause some adverse effects including neurological behavioral changes and maternal hypertension.<sup>[7,8,11,12]</sup> Additionally, the effect of drugs on preventing PONV is not the same in all patients and it is usually inadequate.<sup>[8,12]</sup> On the other hand, people's tendency to use complementary therapies is rapidly increasing. Therefore, it is appropriate to consider using non-pharmacological and complementary therapies for preventing anxiety and PONV. Among the suggested methods, acupressure, acupuncture, and music therapy are highly recommended.<sup>[4,13]</sup>

Auriculotherapy, which means stimulating the auricle or external ear, is one of the non-pharmacological and complementary therapies.<sup>[14-16]</sup> Auricular therapy for preventing anxiety and PONV has been evaluated by various studies, but they have used different techniques for acupoint stimulation and their results have been contradictory. The results of a study by Feng *et al.*<sup>[17]</sup> showed that auricular acupoints stimulation had positive effects on PONV in patients undergoing general anesthesia. The three auricular acupressure points which had been chosen were shenmen, point zero, and the subcortex point. Moreover, Wunsch *et al.*<sup>[11]</sup> reported that auricular acupuncture could decrease preoperative anxiety and welling fixed needles were applied bilaterally at the points MA-IC1, MA-TF1, MA-SC, MA-AH7, and MA-T the day before surgery. Additionally, Kuo *et al.*<sup>[5]</sup> indicated that auricular acupressure at the shenmen point could reduce post-cesarean anxiety. On the other hand, Yeh *et al.* showed that auricular acupressure by seeds did not have any positive effect on PONV in patients with lumbar spine surgery.<sup>[18]</sup> As well, another study indicated that auricular acupressure by handle could not treat post-cesarean anxiety.<sup>[19]</sup> Although there are various techniques for auriculotherapy, the optimal technique has not been determined yet. Therefore, the present study was conducted to determine the effects of auriculotherapy on nausea, vomiting, and anxiety in patients undergoing elective CS with spinal anesthesia.

## Materials and Methods

The present study was a clinical trial study that was performed on 56 pregnant women who were candidates for CS with spinal anesthesia at Omolbanin Hospital, Mashhad, Iran, from September 2016 to February 2017. The study was registered in the Iranian Registry of Clinical trials (IRCT20180526039845N1). Inclusion criteria for study participants were: age 18–38 years, singleton pregnancy, gestational age more than 37 weeks, having hearing and speaking ability, no addiction to drugs, sedatives, and alcohol, no history of mental problems, infertility, migraine, and hyperemesis gravidarum, lack of injuries and wounds at the ears, no history of auriculotherapy, not taking any antiemetic or anti-anxiety drugs or herbal medicines 24 h before surgery, and not having a relative or absolute limitation for spinal anesthesia. Exclusion criteria were: unsuccessful spinal anesthesia, complications during and after surgery such

as excessive bleeding, pelvic organ adhesions (diagnosis of adhesions during surgery), fetal death, and the patient's unwillingness to continue cooperation in research. This sample size was calculated according to the study of Stain *et al.*<sup>[20]</sup> Using a confidence level of 95% and power of 90%, a sample size of 25 was calculated for each group, considering a 10% sample loss, the sample size in each group increased to 28 people. Fifty-six women participated in the study, of whom 28 were in the intervention group and 28 were in the control group. After enrolment, patients were randomly allocated into two groups (based on the latest national code number, individuals with even numbers entered the intervention group and individuals with odd numbers entered the control group): Auriculotherapy and control: After allocating, 1 h before surgery, the participants in each group complete a written informed consent, the socio-demographic questionnaire and State Anxiety (SA). Then the intervention was performed. The auricular therapy was delivered by a professional midwife accredited for practicing auriculotherapy. Before the study, the researcher had participated in an auriculotherapy workshop and had acquired practical skills with the aid of a traditional medicine specialist. After sterilizing the participant's auricles with 75% alcohol preparation pads, in the auriculotherapy group, four acupoints including shenmen, subcortex, kidney, and abdominal<sup>[21]</sup> bilaterally were stimulated using the Pointer Excel II stimulator at the frequency of 1.5–2 Hz for 20–30 s in each acupoint (depending on patient tolerance), then plaster with the seed (Vaccaria ear seeds) fixed on these points.<sup>[21]</sup> In this study, each point was stimulated in a circular motion for 30 s (a total of 4 turns or 2 min per point). Auricular therapy was performed once for 8 min in each ear (a total of 16 min in both ears). For the control group of the study, non-sided adhesives were placed in the same parts of the intervention. Women in both control and intervention groups received the same standard care offered at the hospital.

The primary outcome measure was preoperative anxiety, which was measured before the Auricular Acupoint Stimulation (AAS) intervention, at a comparable time point in the control group (time I), 30–40 min after the intervention (immediately before surgery) (time II) and 4 h after surgery (time III) using the state form of the Iranian version of the State-Trait Anxiety Inventory (STAI), ranging from 20 (= no anxiety) to 80 (= maximum imaginable anxiety).<sup>[22]</sup> The standard STAI was introduced by Spielberger *et al.* in 1970. This inventory was made up of 40 questions divided equally into two subscales for SA and trait anxiety. The scores ranged from 1 to 4. Positive items scored from very low (4), low (3), high (2), to very high (1). Negative items had a reverse scoring from very low (1), low (2), high (3), to very high (4). The total score in each subscale was between 20 and 80.<sup>[23]</sup> The validity and reliability of this questionnaire for the Iranian population were confirmed by Mahram (1994).<sup>[22]</sup> This inventory has been used repeatedly in several studies in Iran to measure anxiety and was

confirmed to have good validity and reliability. In the study of Mousavi *et al.*, the reliability of the test was 0.84.<sup>[19]</sup>

The secondary outcome measure was the severity of nausea, which was measured by using a 10 cm visual analog scale (VAS-10; 0 = no nausea and 10 = maximum imaginable nausea) at time points, 5 min after spinal anesthesia (time I), 10 min after spinal anesthesia (time II), in the recovery room, 1 h after surgery (time III). For this study, nausea that was less than 3 cm was classified as mild, nausea between 3 cm and 5 cm was regarded as moderate, and nausea higher than 5 cm was considered severe. Additionally, a Vomiting Assessment Form for the severity of vomiting was as follows: (0 = without retching or vomiting, 1 = retching without vomiting, 2 = vomiting with or without retching). All questionnaires in both groups were completed by the researcher through interviews.

All statistical analyses were performed with SPSS software (V. 16) (IBM, SPSS Inc., Chicago, Illinois, USA). Normalization of the data was first measured using the Shapiro-Wilk and Kolmogorov-Smirnov tests. Analysis was performed using the Independent-Samples T-test, Mann-Whitney test, Friedman test, and Chi-square test. In the current study,  $p < 0.05$  was considered statistically significant.

### Ethical considerations

This study was approved and supported by Mashhad University of Medical Sciences, in 2016 (Ethics Committee code IR.MUMS.REC.1394.586). The authors certify that they have obtained the appropriate patient consent form. In the form, the patients have given their consent for clinical information to be reported in the journal. The patients were assured that their names and initials would not have been published. Moreover, the participants could have left the study at any time.

## Results

During the study period, three participants (one from auriculotherapy and two from the control group) were excluded [Figure 1]. The mean (SD) age of women participating in the study was 29.32 (04.51) years in the intervention group and 29.92 (04.60) years in the control group. The mean (SD) gestational age was 38.45 (0.92) weeks in the intervention group and 38.64 (0.67) weeks in the control group. The level of education of most participants in both intervention (51.6%) and control (50.0%) groups was a diploma. There were no significant differences in baseline characteristics (sociodemographic data) such as the number of pregnancies, education, the job of women, pregnancy planning, marital satisfaction, maternal feeling, satisfaction with the gender of the baby, the severity of nausea and vomiting during pregnancy, woman's age, and weight and gestational age.

( $p > 0.05$ ) [Table 1].

Although there were no significant differences in anxiety between the study groups at any of the three time points of primary outcome measurement, the course of anxiety differed between the groups, as indicated by the interaction effect of group time (time II vs time I) by Friedman test ( $p = 0.008$ ).

In patients in the intervention group, anxiety decreased during the study so the level of anxiety in time III ( $p = 0.003$ ) decreased more than in time II. ( $p = 0.025$ ). However, there was no significant difference in anxiety levels in the control group ( $p > 0.05$ ). The results showed that there were no significant changes between the two groups in all three times.[Table 2, Figure 2].

Regarding the secondary outcome, there were no significant differences in the severity of nausea (3.7 in the auriculotherapy group and 3.8 in the control group) between the study

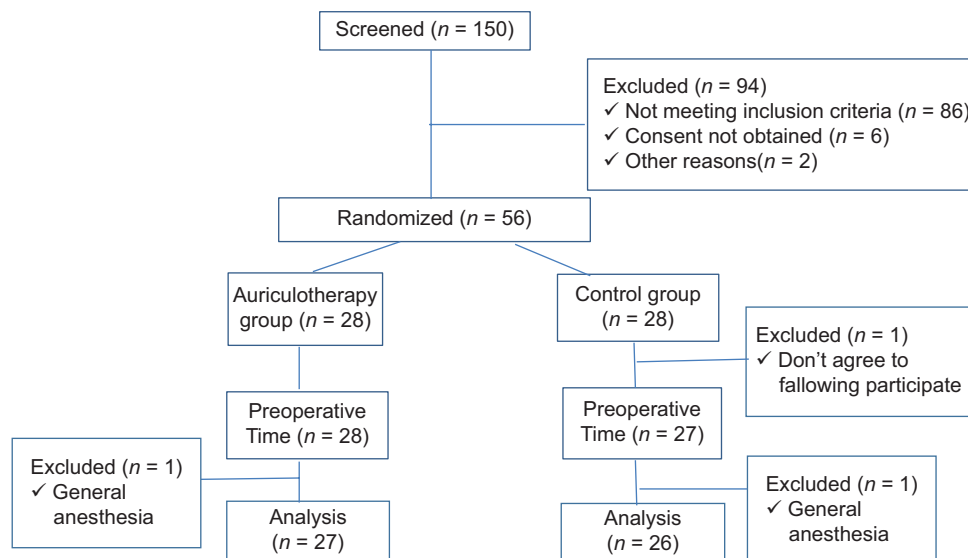


Figure 1: Study flow diagram

**Table 1: Comparison of contextual variables in the two groups**

Variable	Classification	Auriculotherapy	Control	Test statistic	p
		n (%)	n (%)		
Number of pregnancies	First	2 (7.40)	2 (7.69)	Z=-0.43	0.66***
	Second	6 (22.22)	8 (30.76)		
	Third	12 (44.44)	10 (38.46)		
	Fourth and more	7 (25.92)	6 (23.07)		
Education of woman	High school	11 (40.74)	12 (46.15)	F=2.56	0.77*
	Diploma	14 (51.85)	14 (53.84)		
	University	1 (3.70)	0 (0)		
Woman's job	Employee	1 (3.70)	0 (0)	F=0.95	0.33*
	Homemaker	26 (96.29)	26 (100)		
Pregnancy planning	Yes	14 (51.85)	12 (46.15)	F=0.52	0.80*
	No	13 (48.14)	14 (53.84)		
Marital satisfaction	Very satisfying	7 (25.92)	8 (30.76)	F=4.53	0.17*
	Satisfying	16 (59.25)	9 (34.61)		
	Rather satisfying	4 (14.81)	7 (26.92)		
	Dissatisfying	0 (0)	2 (7.69)		
Maternal feeling	Very happy	11 (40.74)	10 (38.46)	F=4.17	0.27*
	Happy	14 (51.85)	11 (42.30)		
	Not happy or sad	2 (7.40)	2 (7.69)		
	Sad	0 (0)	3 (11.53)		
Satisfaction with the gender of the baby	Yes	21 (77.77)	21 (80.76)	F=1.33	0.73 *
	It doesn't matter	6 (22.22)	4 (15.38)		
	No	0 (0)	1 (3.84)		
The severity of nausea and vomiting during pregnancy	No nausea	8 (29.62)	7 (26.92)	F=2.38	0.70*
	Very mild	4 (14.81)	5 (19.23)		
	Mild	2 (7.40)	2 (7.69)		
	Moderate	9 (33.33)	11 (42.30)		
	Severe	4 (14.81)	1 (3.84)		
Woman's age		Mean (SD)	Mean (SD)	t=-1.10	0.87**
		29.32 (04.51)	29.92 (04.60)	df=53	
Gestational age	Mean (SD)	38.45 (0.92)	38.64 (0.67)	Z=-0.76	0.37***
Woman's weight	Mean (SD)	77.89 (16.57)	76.69 (14.23)	t=0.43	0.54**
				df=51	

\*Fisher's Exact test. \*\*Independent-Samples *t* Test. \*\*\*Mann-Whitney test

groups at any of the three time points ( $p > 0.05$ ) [Table 3]. In addition, we didn't find a significant difference between the two groups in the severity of vomiting during the study time ( $p > 0.05$ ). The results showed that there were no significant changes between the two groups in all three times.

## Discussion

In this study, we investigated the effect of auriculotherapy on pre and postoperative anxiety and the prevention of PONV, in women undergoing elective CS. In our study, preoperative and postoperative anxiety were significantly decreased in comparison with anxiety before the intervention in patients who received AAS. However, in the control group, this decrease was not statistically significant. Although there are differences in auriculotherapy methods and choosing acupoints, many studies indicate that auricular therapy significantly reduces pre- and postoperative anxiety.<sup>[5,11]</sup> The results also showed that auriculotherapy

reduced the severity of nausea and vomiting, but these changes were not significant.

Wunsch *et al.*<sup>[11]</sup> conducted a study about the effectiveness of auricular acupuncture in five points (lung, shenmen, kidney, subcortex, and adrenal gland) for the treatment of preoperative anxiety. In agreement with the current study, in their findings, preoperative anxiety decreased in the intervention group during the study. As well a study conducted by Shu-Yu Kuo showed auricular acupressure significantly reduced post cesarean anxiety. They stimulated shenmen acupoint by seed, twice a day for four days.<sup>[5]</sup> They compared the patient's anxiety four days after the intervention, but we assessed it on the intervention day.

Moreover, in this study, it was not confirmed that the AAS was effective in preventing PONV. In congruence with the current study, Yeh *et al.*<sup>[18]</sup> showed that auricular acupressure by embedding the seeds in six auricular acupoints (shenmen,



**Table 2: Comparison of mean anxiety scores in two groups of auriculotherapy and control in different time periods**

State anxiety	Auriculotherapy Means (SD)	Control Means±SD	Test statistic	p
I: Before intervention (30–40 min before the surgery)	47.88 (8.67)	47.84 (10.49)	t=-0.11 df=53	0.275*
II: Immediately before surgery	44.07 (9.40)	46.69 (11.30)	Z=-1.08	0.341**
III: 4 h after surgery	40.23 (10.19)	42.88 (12.18)	Z=-0.81	0.417**
Friedman test	p=0.008	p=0.275		

\*Independent-Samples t Test. \*\*Mann-Whitney test

**Table 3: Comparison of nausea severity in two groups of auriculotherapy and control in different time periods**

Time	Severity of nausea	Auriculotherapy n (%)	Control n (%)	Mann-Whitney test	
I: 5 min after spinal anesthesia	No nausea	19 (70.37)	17 (65.38)	Z=-0.33	p=0.739
	Mild	4 (14.81)	6 (23.07)		
	Moderate	3 (11.11)	2 (7.69)		
	Severe	1 (3.70)	1 (3.84)		
II: 10 min after spinal anesthesia	No nausea	24 (88.88)	22 (84.61)	Z=-0.51	p=0.607
	Mild	3 (11.11)	2 (7.69)		
	Moderate	0 (0)	2 (7.69)		
III: Recovery room	No nausea	25 (92.59)	23 (88.46)	Z=-0.54	p=0.587
	Mild	2 (7.40)	2 (7.69)		
	Moderate	0 (0)	1 (3.84)		
	Severe	0 (0)	0 (0)		

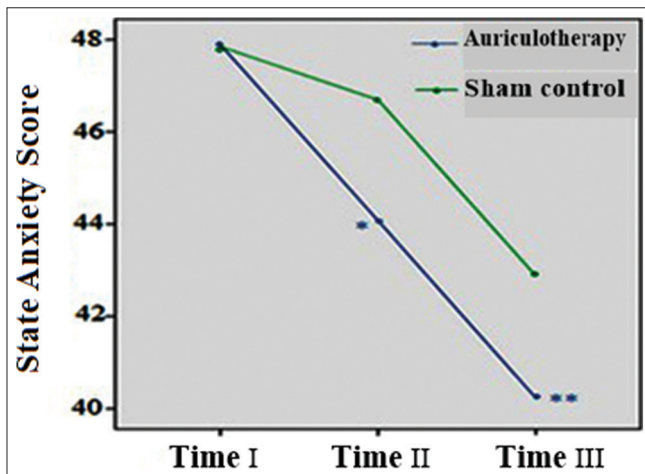


Figure 2: Comparison of anxiety in two groups at three time periods. Before surgery before intervention (time I), 30–40 min after the intervention (time II), and 4 h after surgery (time III). \*p = 0.025 time II vs time I and \*\* p = 0.003 time III vs time I in AAS p > 0.05 in control

lumbar-sacrum vertebra, occipital, stomach, endocrine, and cardia) did not have any positive effect on PONV in patients with lumbar spine surgery. While in a study by Yeh *et al.*<sup>[24]</sup> which was done in children undergoing cancer chemotherapy, the patients who received auricular acupressure, were reported to have significantly lower nausea and vomiting than patients in the standard care group; however, there were no significant differences in nausea and vomiting between using auricular acupressure points in the intervention group

and sham acupressure points in the control group. The researchers said that it might be because of psychological effects. In our study, although the incidence and severity of PONV were low in the AAS group, it was similar to the control group. In contrast to our findings, a study in China reported that auriculotherapy by electrical stimulation on the shenmen point could reduce PONV in CS.<sup>[5,25]</sup> Explaining the difference between the result of this study and the present study is that their intervention group received auricular acupressure on the shenmen acupoint twice a day for seven days. As well Zhang *et al.*<sup>[26]</sup> conducted a study in China to assess the effect of auricular acupressure on PONV in patients with gynecological laparoscopy under general anesthesia. They reported, in patients who received auricular acupressure, PONV is significantly lower than in the placebo group. It might be because of the difference in auricular acupressure time and technique. They used Vaccaria seeds on three points and each point was pressed 5 min, for three times (before the laparoscopy and 1, 5, 9, and 23 h after that). While we used the placebo at the ear of the control group to reveal the effectiveness of auriculotherapy and it was because of the treatment itself not for psychological effects. The limitations of this study are the risk of unblinding the evaluator and a double-blind design could be more appropriate. Moreover, it is better to follow up on the acupressure effect for more time, after the intervention.

## Conclusion

According to the results of the present study, auriculotherapy could reduce pre and postoperative anxiety in CS patients with spinal analgesia. The results also showed that auriculotherapy reduced the severity of nausea and vomiting, but these changes were not significant.

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## Conflicts of interest

Nothing to declare.

## References

- Betran AP, Ye J, Moller AB, Zhang J, Gulmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: Global, regional and national estimates: 1990-2014. *PLoS One* 2016;11:e0148343. doi: 10.1371/journal.pone.0148343.
- Rafei M, Saei Ghare M, Akbari M, Kiani F, Sayehmiri F, Sayehmiri K, *et al.* Prevalence, causes, and complications of cesarean delivery in Iran: A systematic review and meta-analysis. *Int J Reprod Biomed (Yazd, Iran)* 2018;16:221-34.
- Dadipoor S, Madani A, Alavi A, Roozbeh N, Safari Moradabadi A. A survey of the growing trend of caesarian section in Iran and the world: A review article. *IJOGI* 2016;19:8-17.
- Abadi F, Abadi F, Fereidouni Z, Amirkhani M, Karimi S, Najafi Kalyani M. Effect of Acupressure On Preoperative Cesarean Section Anxiety. *J Acupunct Meridian Stud* 2018;11:361-6.
- 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. *Int J Nurs Stud* 2016;53:17-26.
- Noroozinia H, Mahoori A, Hasani E, Gerami-Fahim M, Sepehrvand N. The effect of acupressure on nausea and vomiting after cesarean section under spinal anesthesia. *Acta Med Iran* 2013;51:163-7.
- Liodden I, Howley M, Grimsgaard AS, Fonnebo VM, Borud EK, Alraek T, *et al.* Perioperative acupuncture and postoperative acupressure can prevent postoperative vomiting following paediatric tonsillectomy or adenoidectomy: A pragmatic randomised controlled trial. *Acupunct Med* 2011;29:9-15.
- Zeraati H, Shahinfar J, Imani Hesari S, Masromiya M, Nasimi F. The effect of ginger extract on the incidence and severity of nausea and vomiting after cesarean section under spinal anesthesia. *Anesth Pain Med* 2016;6:e38943. doi: 10.5812/aapm.38943.
- Hailu S, Mekonen S, Shiferaw A. Prevention and management of postoperative nausea and vomiting after cesarean section: A systematic literature review. *Ann Med Surg (Lond)* 2022;75:103433. doi: 10.1016/j.amsu.2022.103433.
- Nikooseresht M, Hajian P, Alipour N, Babamir M, Shirmohammadi, Khorram N. The effect of pre-and intraoperative anxiety on hemodynamic changes after spinal anaesthesia in cesarean section. *Avicenna J Clin Med* 2018;24:291-8.
- Wunsch JK, Klausenitz C, Janner H, Hesse T, Mustea A, Hahnenkamp K, *et al.* Auricular acupuncture for treatment of preoperative anxiety in patients scheduled for ambulatory gynaecological surgery: A prospective controlled investigation with a non-randomised arm. *Acupunct Med* 2018;36:222-7.
- Watcha MF, White PF. Postoperative nausea and vomiting. Its etiology, treatment, and prevention. *Anesthesiology* 1992;77:162-84.
- El-Deeb AM, Ahmady MS. Effect of acupuncture on nausea and/or vomiting during and after cesarean section in comparison with ondansetron. *J Anesth* 2011;25:698-703.
- Mafetoni RR, Rodrigues MH, Jacob L, Shimo AKK. Effectiveness of auriculotherapy on anxiety during labor: A randomized clinical trial. *Rev Lat Am Enfermagem* 2018;26:e3030. doi: 10.1590/1518-8345.2471.3030.
- Oleson T. *Auriculotherapy Manual: Chinese and Western Systems of Ear Acupuncture*. Elsevier Health Sciences; 2013.
- Frões NBM, Arrais FAS, Aquino PS, Maia JC, Balsells MMD. Effects of auriculotherapy in the treatment of nausea and vomiting: A systematic review. *Rev Bras Enferm* 2021;75:e20201350. doi: 10.1590/0034-7167-2020-1350.
- Feng C, Popovic J, Kline R, Kim J, Matos R, Lee S, *et al.* Auricular acupressure in the prevention of postoperative nausea and emesis a randomized controlled trial. *Bull Hosp Jt Dis (2013)* 2017;75:114-8.
- Yeh M-L, Tsou M-Y, Lee B-Y, Chen H-H, Chung Y-C. Effects of auricular acupressure on pain reduction in patient-controlled analgesia after lumbar spine surgery. *Acta Anaesthesiol Taiwan* 2010;48:80-6.
- Mousavi FS, Golmakani N, Bahrami Taghanaki HR, Saki A, Akhlaghi F. Effects of auriculotherapy on post cesarean anxiety. *IJOGI* 2017;20:50-60.
- Stein DJ, Bimbach DJ, Danzer BI, Kuroda MM, Grunebaum A, Thys DM. Acupressure versus intravenous metoclopramide to prevent nausea and vomiting during spinal anesthesia for cesarean section. *Anesth Analg* 1997;84:342-5.
- Olson T. *Translator: Ansari A. Ear Acupuncture Guide (Auriculotherapy)*. Andisheh City Elite Publications; Esfahan. Iran. 2019.
- Heshmatifar N, Mohebbi M, Borzooe F, Rakhhani M. The effect of mental imagery on preoperative anxiety of elective hernia. *CMJA* 2020;9:3930-9.
- Gustafson LW, Gabel P, Hammer A. Validity and reliability of state-trait anxiety inventory in Danish women aged 45 years and older with abnormal cervical screening results. *BMC Med Res Methodol* 2020;20:89.
- Yeh CH, Chien L-C, Chiang YC, Lin SW, Huang CK, Ren D, *et al.* Reduction in nausea and vomiting in children undergoing cancer chemotherapy by either appropriate or sham auricular acupuncture points with standard care. *J Altern Complement Med* 2012;18:334-40.
- Hu Y, Cheng X, Su X, Fu Y. Auricular therapy improves gastrointestinal function in patients with gynecological laparoscopic surgery: A protocol for systematic review and meta analysis. *Medicine* 2020;99:e23421. doi: 10.1097/MD.00000000000023421.
- Zhang L-H, Cao C-L, Li J-Z, Chen M-L, Wang M-S, Dai C-Y, *et al.* Influence of auricular point sticking on incidence of nausea and vomiting and analgesia effect after gynecological laparoscopy. *Zhongguo Zhen Jiu* 2013;33:339-41.