Evidence Based Care Journal

http://ebcj.mums.ac.ir/

Comparison of the Effect of Lidocaine Spray and Acupressure on the Severity of Intramuscular Injection Pain

Maryam Sadat Hoseini, Sedighe Beygom Hoseini, Zohreh Mohamadzadeh Tabrizi, Sedighe Rastaghi, Arezoo Davarinia Motlagh Quchan

The online version of this article can be found at
https://ebcj.mums.ac.ir/article_19318.html

Evidence Based Care Journal 2021 11: 26 originally published online 19 December 2021
DOI: 10.22038/EBCJ.2021.61629.2601

Online ISSN: 2008-370X

Address: Mashhad Nursing and Midwifery School, Ebn-e-Sina St., Mashhad, Iran
P.O.Box: 9137913199
Tel.: (098 51) 38591511-294
Fax: (098 51) 38539775
Email: EBCJ@mums.ac.ir

Evidence Based Care Journal

Original Article

OPEN ACCESS JOURNALS

Comparison of the Effect of Lidocaine Spray and Acupressure on the Severity of Intramuscular Injection Pain

Maryam Sadat Hoseini[1], Sedighe Beygom Hoseini[1], Zohreh Mohamadzadeh Tabrizi[2], Sedighe Rastaghi[3], Arezoo Davarinia Motlagh Quchan[4*]

Received: 24/11/2021
Accepted: 19/12/2021

Evidence Based Care Journal, 11 (4): 26-32

Abstract

Background: Patients experience pain after intramuscular (IM) injection. Lidocaine and acupressure are two methods that can be used for the reduction of pain in patients.

Aim: The present study aimed to compare the effect of lidocaine spray and acupressure on the severity of pain induced by IM injection.

Method: This randomized clinical trial was conducted on 254 participants who received IM injections in the Emergency Department of 22 Bahman Hospital in Neyshabur, Iran, in 2019. They were selected via convenience sampling and randomly assigned to three groups of lidocaine spray, acupressure, and control by permuted block randomization method. Data were collected using demographic characteristics form and visual analog scale (VAS). Data were analyzed in SPSS software (version 25).

Results: The mean scores of pain intensity in the lidocaine spray (1.78) and acupressure (1.83) groups were lower, as compared to that in the control group (2.83). Nonetheless, the results of this study revealed that there was no significant difference between acupressure and lidocaine spray in the reduction of pain intensity (P=0.400). Moreover, demographic variables had no effect on the severity of pain induced by IM injection.

Implications for Practice: As evidenced by the obtained results, acupressure and lidocaine spray were not statistically effective in reducing the severity of pain induced by IM injection. The reduction in mean pain intensity in these methods was clinically significant, compared to that in the control group.

Keywords: Acupressure, Injections, Intramuscular, Lidocaine, Pain

---

1. Student in Surgical Technologist, Department of Operation Room, School of Paramedic, Student Research Committee, Sabzevar University of Medical Sciences, Sabzevar, Iran
2. Lecturer, Department of Operation Room and Anesthesia, School of Paramedic, Sabzevar University of Medical Sciences, Sabzevar, Iran
3. PhD Student in Biostatistics, Department of Biostatistics, Student Research Committee, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran
4. Lecturer, Department of Operation Room and Anesthesia, School of Paramedic, Sabzevar University of Medical Sciences, Sabzevar, Iran

* Corresponding author, Email: a.davarinia@yahoo.com

Introduction

Pain, which is caused by a variety of factors, is a condition that can bring about fear and anxiety in most people more than any other illness (1). Pain is an unpleasant sensory experience that is called the fifth vital sign by the American Pain Society due to its importance, and 2000-2010 was proclaimed "the Decade of Pain Control"(2). Pain can lead to physiological changes, such as increased heart and respiration rate, sweating, skin redness, decreased blood oxygen saturation, dilated pupils, restlessness, and increased blood pressure (3). Injections, especially intramuscular injection (IM), are one of the most common and painful medical interventions administered to more than 12 billion people around the world annually (4).

In their study, Asgari et al. have demonstrated that 5.3% and 22% of adult patients have a severe and moderate fear of needles, respectively (1). Most patients believe that IM is an unpleasant and stressful experience (5) and look for alternatives to relieve pain when they are prescribed to have an IM(6). Researchers have assessed different methods for the reduction of injection pain, putting an emphasis on the use of less aggressive and safer methods in the first place (7). There are two major approaches to injection pain relief: pharmacological and non-pharmacological (2). Pharmacological treatments often cause some complications, namely a decline in blood pressure, impaired vital signs, such as respiration and heart rate, drowsiness, nausea, vomiting, constipation, allergic reactions (sometimes), and even shock. Apart from numerous physical and mental complications, such treatments can result in drug dependence and impose a huge financial burden on the health system of countries (8).

Local anesthesia techniques using gels, ointments, patches, and local anesthetic sprays are among the effective pharmacological treatments that can relieve the pain of medical procedures (1). Asgari et al. signified that lidocaine spray can reduce the pain of hemodialysis needles (1). Pharmaceutical options are currently the first and best option for acute pain. A non-pharmacological method that has recently received great attention is acupressure (9) which can be applied by physicians, nurses, and even patients themselves (2). Based on the gate control theory, acupressure can relieve pain (10) without interfering with other treatments (11). In acupressure, instead of a needle, specific places of the body are pressed by fingers to stimulate body energy and improve a condition (12).

Previous studies have investigated the effects of acupressure on various types of pain, such as tension headaches, migraines, labor pains, dysmenorrhea, postoperative pain, hip fractures, and back pain (7, 13-15). The IM is a highly common (12 billion) but painful and stressful way of administering drugs or vaccines to patients (5). Despite the 80-year history of IM, multiple dimensions of this procedure have not yet been studied, such as injection site pain, and IM pain is one of the unresolved health problems (4). Pain relief and wound healing can be achieved in various methods (16). One of the most common strategies for pain management is the use of analgesics. Nevertheless, these medications are associated with a variety of adverse side effects (e.g., drowsiness, constipation, dry mouth, gastrointestinal bleeding, and addiction).

Pharmaceutical options are currently the first and best option for acute pains. Complementary and alternative medicine therapies offer additional options for pain management (17). Given the importance of pain relief and the need for further studies on methods for the relief of IM pain, the present study aimed to compare the effects of lidocaine spray and acupressure on the severity of IM injection pain.

Methods

A clinical trial based on block randomization was conducted on 254 people who received an IM injection in the Emergency Department of 22 Bahman Hospital in Neishabour, Iran, in 2019. The inclusion criteria were as follows: the age range of above 15 years old (18), willingness to participate in the study, non-affliction with neuromuscular diseases, no history of acupressure, no sign of sores and bruises at the injection site, and minimum communication skills. The only exclusion criterion was reluctance to continue the study. The sample size was calculated at 84 cases in each group based on the study conducted by Farhadi (18), as well as considering a confidence level of 95% and a test power of 0.95%.

The participants were selected via the convenience sampling method and randomly assigned to three groups of control (A), lidocaine spray (B), and acupressure (C) based on permuted random allocation. Participants in Group A only received an IM injection without any intervention, those in Group B received lidocaine spray at least 3 min before the IM, and those in Group C underwent acupressure on the UB31 area for 3 min before the IM. A nurse performed all the injections on the upper and outer quarter of the dorsogluteal muscle based on the World Health Organization (WHO) standard method. Accordingly,

the skin of the injection site was stretched and the needle was inserted into the skin at a 90-degree angle (19). All drugs were injected at a rate of 1 ml per 10 sec using a 2-cc syringe and needle No. 22 .

The nurse was fully trained on the correct techniques of acupressure before the study. The acupressure was perfumed in this study as follows: while the patient was lying down prone, the closest pressure point to the injection site was identified (UB-31), which is located in the external area. When this area is pressed, one feels the highest sensitivity and pressure (19). The nurse rotationally massaged the pressure point with his/her palm and then pressed the same point with his/her thumb three times. In Group B, the injection site skin was cleaned, and two puffs of 10% lidocaine spray were then applied to the skin surface at a distance of 10 cm. The IM was performed three min later. Figure 1 displays the pressure point (UB-31) used for acupressure in this study to relieve IM pain.

The data were collected using a demographics characteristic form and the pain visual analog scale (VAS). The demographics form consisted of items about age, gender, weight, height, and history of undergoing acupressure. The pain VAS, which ranges between 0 and 10, was used to measure the severity of IM pain. On this scale, 0 and 10 represent no pain and the most severe pain felt by the patient, respectively. The scientific validity and reliability of this scale have been proved in a previously performed study (10).

Before injections, the participants were briefed about the pain severity measurement and were asked to rate their pain immediately after the IM pain on a scale of 0 (no pain) to 10 (the most severe pain). Moreover, necessary arrangements were made with officials of the studied hospital and its emergency department. All participants were briefed on the study objectives and procedure; moreover, they were assured that they could leave the study anytime they desired and their information would be kept confidential. Thereafter, informed written consent was obtained from participants before the commencement of the study. To comply with the standards of research ethics and confidentiality, the questionnaires were encoded before being distributed among the participants (Figure 1).

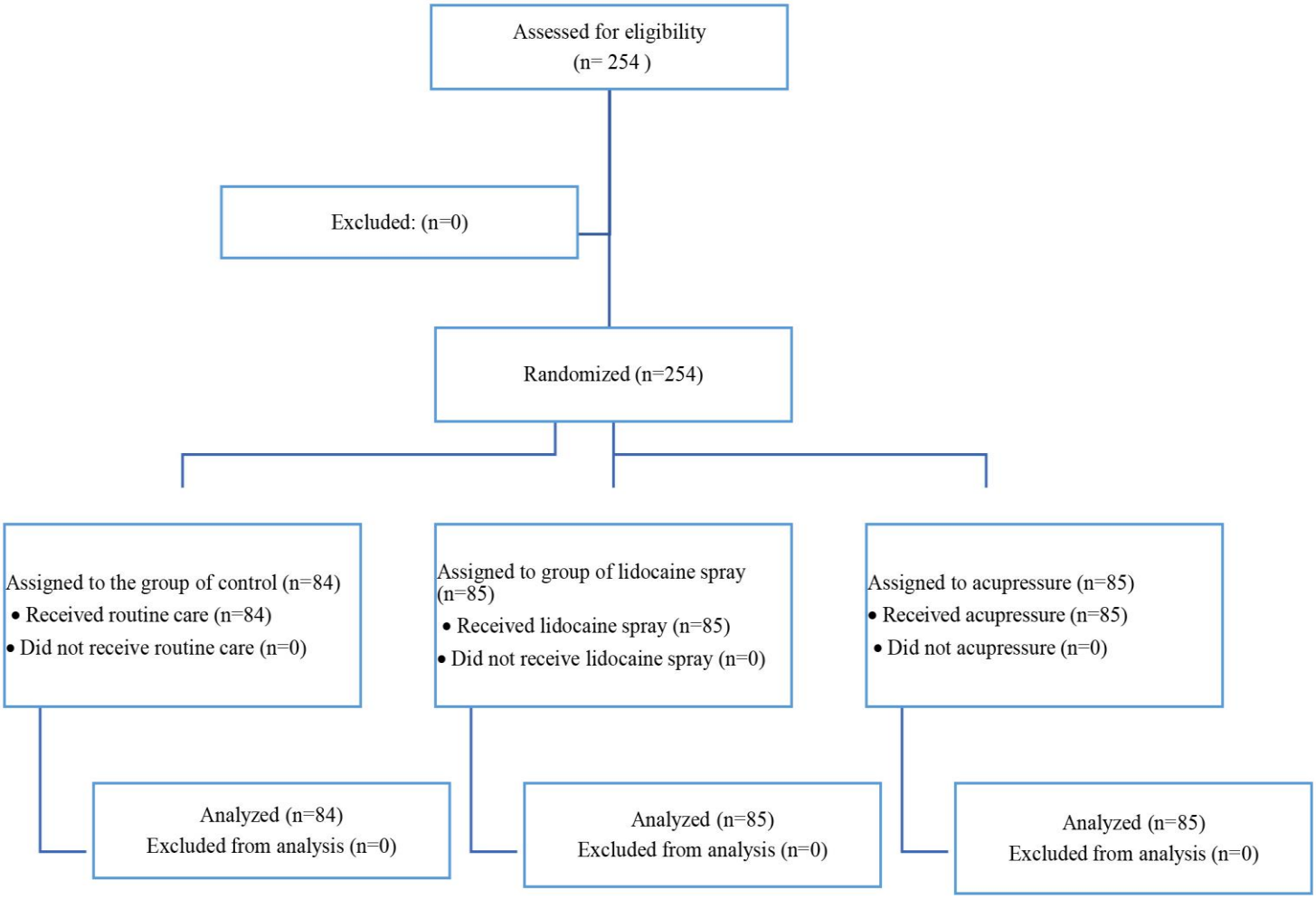

Figure 1. Consort Flow Diagram

The Fisher's exact test was used to examine the relationship between the history of undergoing acupressure and severity of pain, while the chi-square test was employed to test the relationship of the type of pain severity with the drug taken by patients and their gender. In addition, the relationship of pain severity with demographic variables (height, weight, and age) and the intervention type was investigated by the Kruskal-Wallis test. Furthermore, the Kolmogorov-Smirnov test was used to determine the normality of quantitative variables. All statistical tests were performed in SPSS software (version 25).

Results

Out of the 254 participants, 128 (50.4%) cases were male and 126(49.6%) subjects were female. Most of them had a history of undergoing acupressure (99.6%). In terms of education, the majority (89.4%) of participants had a high school education. The most common drugs taken by participants were ketorolac (26%), dexamethasone (16.1%), betamethasone (9.1%), beta-lactate (5.9%), ondansetron (5.1%), and others (37.8%).

The results of Fisher's exact test and chi-square test pointed out that there was no significant difference among the three groups in terms of the relationship of the history of undergoing acupressure (p=0.999), drug type (p=0.421), and gender (p=0.999) with the severity of IM pain (Table 1).

Table 1. Absolute and relative frequency of demographic characteristics of the studied units

Demographic variable		Group: Number (percent)			p-value
		Acupressure	Lidocaine spray	Control	
History of Acupressure	Yes	1 (1.2)	0(0)	0(0)	F =1.817*
	No	84 (98.8)	85(100)	84(100)	p =0.999
Type of medicine	1 CC	58 (68.2)	50(58.8)	55(65.5)	χ^2=1.730
	2 CC	27 (31.8)	35(41.2)	29(34.5)	df=2 p=0.421**
Gender	Male	43 (50.6)	43(50.6)	42(50.4)	F=3.674*
	Female	42 (49.4)	42(49.4)	42(49.6)	p =0.999

*Fisher exact test ** Chi-square test

The Kruskal–Wallis test also indicated that there was no significant difference among the three groups in age (P=0.151), weight (P=0.906), height (P=0.259) (Table 2), and the severity of IM pain (P=0.40) (Table 3).

Table 2. Absolute and relative frequency of demographic characteristics of the studied units

Demographic variable	group	Average	Standard deviation	p-value*
Age	Acupressure	35.85	43.10	df=2
	Lidocaine spray	34.14	10.15	H=3.776
	Control	33.67	10.51	p= 0.151
Weight	Acupressure	69.08	18.58	df=2
	Lidocaine spray	70.10	17.57	H=0.906
	Control	68.86	14.44	p-= 0.906
Height	Acupressure	164.72	20.26	df=2
	Lidocaine spray	162.23	20.59	H=0.259
	Control	163.61	10.76	p-= 0.259

* Kruskal Wallis

Table 3. Mean and standard deviation of pain intensity of research units

	group	Average	Standard deviation	p-value*
Intensity of pain	Acupressure	1.83	1.67	df=2
	Lidocaine spray	1.78	1.81	H=1.834
	Control	2.28	2.23	p-value=0.400

* Kruskal Wallis

Discussion

The present study aimed to compare the effects of lidocaine spray and acupressure on the severity of pain caused by IM. Although the results revealed no significant difference among the lidocaine spray, acupressure, and control groups in the severity of IM pain, the participants in the lidocaine spray and acupressure groups experienced less pain than those in the control group. In agreement with the findings of the present research, Ameri et al. in their study entitled "Effects of EMLA cream and acupressure on the severity of venipuncture pain among inpatients aged 6-12 years", reported that there was no significant difference between the two groups in the severity of venipuncture pain; nonetheless, the participants in these two groups experienced less pain than those in the control group (2).

In the same context, Hosseinzadeh et al. showed that acupressure on Hugo point for 10 min reduced the mean pain score, compared to the control group (10). On the other hand, inconsistent with the results of the present study, Masoudi Alavi et al. assessed the effects of acupressure on IM pain and stated that acupressure on UB31 point reduced IM pain (19). This discrepancy can be attributed to different sites and times of acupressure. To justify this finding, it should be stated that acupressure improves blood and energy flow in the body, establishes a balance between yin and yang symbols, stimulates the secretion of neurotransmitters, activates the opioid system, and removes lactic acid and carbon monoxide accumulated in the body during muscle contraction. Therefore, it maintains the normal function of the body and reduces pain (20).

Asgari et al. examined the severity of pain caused by vascular needles in a group of patients treated with placebo and lidocaine spray and reported that the severity of pain was significantly lower after the use of lidocaine spray (1). Along the same lines, Aksoy et al. also signified that the pre-sampling administration of lidocaine spray reduced the severity of pain (21). This disparity between the results of this study and those of the above-mentioned studies can be ascribed to different sites and times of acupressure. It is noteworthy that that lidocaine, as a local anesthetic, basically blocks the nerve message conduction by the inhibition of voltage-dependent ion channels, reduces depolarization in response to stimulation, and prevents the potential from reaching the threshold point (1). This can explain why lidocaine spray reduces pain.

In line with the findings of the study by Hosseinzadeh et al. (10) but inconsistent with those reported by Masoudi et al. (19), the present research detected no significant relationship between age and severity of IM pain. Gender can also be an important factor in estimating the severity of pain. The results of the current research demonstrated no relationship between gender and severity of pain, whereas Masoudi Alavi et al. reported that acupressure was significantly more effective in the reduction of IM pain in men (19). This suggests that men and women have different mechanisms of pain perception since women are more sensitive to and less tolerant of pain (10).

Some factors, such as social context, previous records of injections, and fatigue, can affect pain perception, and these factors were out of the authors' control in this study. Future studies are recommended to be conducted on larger samples using both interventions (lidocaine spray and acupressure) in intermittent injections. In order to prevent possible errors and their effects on the study results, it is also suggested to use only one type of drug for all patients. Among the limitations of this study, we can refer to the fact that some disorders, such as diabetes, and other neurological deficits were not taken into account.

Implications for Practice

The results of the present study suggested that both lidocaine spray and acupressure were effective in the reduction of IM pain; nonetheless, there was no significant difference between these two interventions in this regard.

Acknowledgments

The present study is an approved research proposal by the Student Research Committee of Sabzevar University of Medical Sciences (97100), and the research project was registered on the Iranian Registry of Clinical Trials (IRCT20180110038300N1). The authors would like to thank the Research and Technology Deputy, the Student Research Committee (IR.MEDSAB.REC.1397.115), and all officials of Sabzevar University of Medical Sciences, all patients visiting 22 Bahman Hospital of Sabzevar, and all individuals who helped us in this study.

Conflicts of Interest
The authors declare that they have no conflict of interest.

References

1. Asgari MR, Hoshmand Motlagh N, Soleimani M, Ghorbani R. Effect of lidocaine spray on the pain intensity during insertion of vascular needles in hemodialysis patients. Koomesh. 2013;14(3):271-9.
2. Foroogh Ameri G, Shah Mohammadi Pour P, Kazemi M, Jahani Y. Comparison of the effect of EMLA cream and acupressure on pain Reduction of venipuncture in 6-12 years old children. J Acupunct Meridian Stud. 2016;2(4):16-22.
3. Irani H, Eshghizadeh M, Zivari M. Effect of Doll Injection Display on Pain Intensity due to Intramuscular Injection in Preschool Children. Horiz Med Sci. 2016;22(3):247-51.
4. Yeganekhah M-R, Abedini Z, Dadkhah Tehrani T. Evaluation of an Applied Method in Reducing the Pain of Intramuscular Injection. Qom Univ Med Sci J. 2013;7(2):1-6.
5. Inangil D, Inangil G. The effect of acupressure (GB30) on intramuscular injection pain and satisfaction: Single–blind, randomised controlled study. J Clin Nurs. 2020;29(7-8):1094-101.
6. Ehsani M HK, Sedaghati M, Ghanbari A. A Comparative Study on Pain Severity Caused by Z-track and Air Lock Methods for Intramuscular Injection. Res Sci J Ardabil Univ Med. 2011;11(4):309-15.
7. Mohammadpour A, Basiri Moghadam M, Davariniya Motalgh Ghochan A, Mojtabavi SJ. Effect of ear acupressure on severity of pain in appendectomy candidate patients before surgery. J Sabzevar Univ. 2017;24(5):327-32.
8. Zavareh Esfehani F, Rejeh N, Sedighi M, Heravi- Karimooi M, Tadrisi SD, Saatchi K, et al. The Effectiveness of Acupressure Therapy on Physiological Criteria in Female Patients Being Weaned from Mechanical Ventilation. J Nurs Midwifery Res. 2019;14(3):10-18.
9. Sharma D, Rana A, Gupta S. Effect Of Acupressure On Intensity Of Labour Pains And Duration Of First Stage Of Labour Among Primigravida Mothers. J Clin Nurs Midwifery. 2013;9(4):178-86.
10. Hosseinzadeh F, Alaee N, Rejeh N, Alemohammad SN. Comparing the Effect of Cryotherapy and Acupressure on Pain Intensity of Arteriovenous Fistula Cannulation in Patients Hemodialysis. Iran J Nurs Midwifery Res. 2019; 14(3):40-47.
11. Adib-Hajbaghery M, Etri M, Hosseainian M, Mousavi MS. Pressure to the p6 acupoint and post-appendectomy pain, nausea, and vomiting: a randomized clinical trial. Scand J Caring Sci. 2013;2(2):115-22.
12. Ghiasi A, Keramat A, Mollaahmadi L, Hashemzadeh M, Bagheri L. The effect of acupressure at the Sanyinjiao (SP6) point on relief of primary dysmenorrhea: a systematic review of clinical trials. Iran J Nurs Midwifery Res. 2017;19(40):55-68.
13. Jafarian Ah, Kooshki Forooshani M, Rasoli Ostadi A, Mohamadian Roshan N. Vascular mimicry expression in invasive ductal carcinoma, A new technique for prospect of aggressiveness. 2019;14(3):232-235.
14. Smith CA, Collins CT, Crowther CA, Levett KM, Crowther CA. Acupuncture or acupressure for pain management in labour. Cochrane Database Syst Rev. 2011;2(7):1-58.
15. Yeh CH, Chien LC, Balaban D, Sponberg R, Primavera J, Morone NE, et al. A randomized clinical trial of auricular point acupressure for chronic low back pain: a feasibility study. Evid Based Complement Alternat Med. 2013;2013:1-9.
16. Moradi M, Mazloumi E, Mousavi SF, Violeta Lopez. Effect of Lavender on Episiotomy Wound Healing and Pain Relief: A Systematic Review. EBCJ. 2020;10(1):61-9.
17. Jouya S, Golmakani N, Mazloum SR, Abdi H, Yosefi Z. Comparison of the Impacts of Auriculotherapy with Electrical Stimulation and Vaccaria Seeds on Colposcopy Pain: A Randomized Clinical Trial. EBCJ. 2018;7(4):55-62.
18. Farhadi A. Evaluation of the effect of 2% Lidocaine gel on the pain intensity of the test and penicillin-benzotine intramuscular injection (200.1000 units). J North Khorasan Univ. 2010;2(2,3):39-44.
19. Masoudi Alavi N, Ataee M, Mohammadi M, Alireazei M, Shafiee M, Abbaszadeh sH, et al. The effectiveness of acupressure on intramuscular injection pain. Feyz. 2008;11(4):14-8.
20. Akbarzade M, Ghaemmaghami M, Yazdanpanahi Z, Zare N, Azizi A, Mohagheghzadeh A, et al.

Comparison of the Effect of Dry Cupping Therapy and Acupressure at BL23 Point on the Primiparous Women's Intensity of Postpartum Perineal Pain: A Randomized Clinical Trial. Qom Univ Med Sci J. 2015;8(6):26-31.

21. Aksoy H, Aksoy U, Ozyurt S, Acmaz G, Babayigit MA, Yücel B, et al. Effect of lidocaine spray in pain management during office-based endometrial sampling: A randomised placebo-controlled trial. J Obstet Gynaecol. 2016;36(2):246-50.