Patient Safety & Quality Improvement Journal
http://psj.mums.ac.ir
PSQI

The Effect of Mint Extract on the Incidence and Severity of Nausea and Vomiting after Cesarean Section under Spinal Anesthesia: a Randomized Clinical Trial

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ARTICLEINFO

Article type:
Original Article

Article history:
Received: 13-Sep-2016
Accepted:04-Oct-2016

Keywords:
Cesarean section
Mint
Nausea
Spinal anesthesia
Vomiting

ABSTRACT

Introduction: Nausea and vomiting are one of the most common complications of cesarean section under spinal anesthesia. Recently, the use of drugs has decreased and non-pharmaceutical and traditional alternative medicine are often preferred.

Materials and Methods: This double-blind, randomized, clinical trial was performed 92 pregnant women who underwent cesarean section under spinal anesthesia. They were randomly divided into two groups of control and intervention. The intervention group received 25 drops of mint and the control group only received water 1 h before the Cesarean. The incidence and severity of nausea and vomiting , as well as two and four h after Cesarean Section was assessed by a self-report questionnaire. Data analysis was performed using independent-t test in SPSS version $_{16}$.

Results: According to independent t-test, there was a significant relationship between the two groups in terms of the incidence and mean severity of nausea (26.1% and 52.2% for the intervention and control groups, respectively; P<0,001) and vomiting (28.9% and 52.2% in the intervention and control groups, respectively; P<0.001) during cesarean section. However, no statistically significant association was found between the two groups regarding the incidence and mean severity of nausea and vomiting 2 and 4 h after Cesarean Section (P>0.05).

Conclusion: The findings of this study showed that mint extract can be used to prevent nausea and vomiting during cesarean section under spinal anesthesia.

► ***Please cite this paper as*:**
ShahinfarJ, ZeraatiH, Imani HesariSh, MasrorniyaM,ShojaeiS.The Effect of Mint Extract on the Incidence and Severity of Nausea and Vomiting after Cesarean Section under Spinal Anesthesia: a Randomized Clinical Trial.Patient SafQualImprov. 2017; 5(1):482-487.

Introduction

Vomiting is an uncontrollable reflex that expels the contents of the stomach through the mouth. It is also called “being sick,” or “throwing up.” Nausea is a term that describes the feeling that might vomit, but are not actually vomiting (1).

Today, nausea and vomiting are the most common postoperative complications. Risk factors for postoperative nausea and vomiting include female gender, history of motion disease, smoking, and the use of opioids after surgery. The incidence of postoperative nausea and vomiting is related to the number of these factors present in a case and effectiveness of prophylactic treatment depends on the presence of preoperative risk factors for patient (2).

Postoperative nausea and vomiting makes the process difficult for patient, surgeon, and anesthesiologist that causes distress, uncertainty, animosity, and increased anxiety in patient.

If these complications continue, they may cause hypotension and reduced heart rate; furthermore, other symptoms such as fatigue, abdominal pain, irritability, sleep disorders, fear, damage to the upper gastrointestinal system, intraocular bleeding, increased intracranial pressure, ulcers, and skin cracking are all

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prevalent (3-5), which delay discharge from recovery room for 47-60 minutes (6).

Extra care and treatment measures are required and this increases the costs for the patient and treatment system.

Former studies showed that patients are willing to spend more to prevent and treat this condition or even prefer to have pain instead of nausea and vomiting (7, 8).Factors affecting the incidence of postoperative nausea and vomiting (e.g., gender, age, obesity, pre-operative anxiety, and type of surgery) are unrelated to anesthesia, while history of nausea and vomiting under a previous anesthesia, the type of administered anesthetic drug, ventilation technique, and the amount administered opioids are associated with anesthesia (9-11).

Prophylactic measures to prevent postoperative nausea and vomiting are clearly more effective than treatment. However, some patients need treatment for postoperative nausea and vomiting, even after appropriate prophylactic treatment. Particular attention should be paid to patients with obesity, diabetes, and pregnant women, who are at risk for postoperative nausea and vomiting (12, 13). Various drugs are used for the prevention and treatment of postoperative nausea and vomiting, the most important of which are butyrophenone, benzamide, histamine receptor inhibitors, muscarinic receptor inhibitors, and 5-hydroxytryptamine-3 receptor inhibitors (14).

Although these drugs are somewhat effective, they could not diminish the prevalence of postoperative nausea and vomiting to an acceptable level.

Consequently, these drugs cause some complications and increase hospital expenditure (15). Recently, the use of chemical drugs has decreased and non-pharmaceutical and traditional alternative medicine are preferred (16). Plant therapy was common in ancient civilization and is still commonplace today. Herbal products or their total extracts are part of the common plant therapy used ubiquitously (17).

Therefore, since the majority of aromatic herbs are edible and have been used for thousands of years, there is a positive attitude toward using medicinal plants, which form the main part of traditional medicine.

Identifying and assessing the effects of these plants would be beneficial as they reduce complications of chemical drugs and invasive procedures (18, 19). Mint is a popular edible vegetable; botanists introduced mint as antispasmodic, anti-vomiting, carminative, analgesic, and anti-microbial (Hoffman, 1996). Mint is a stomach tonic that is also appetitive, carminative, anti-septic, anti-vomiting, and antidiarrheal (20).

Mint is also used for dyspepsia, flatulence, bronchitis, sinusitis, cough caused by spasms, acute abdominal pain, irritable bowel syndrome, nausea, headache, and migraine (21). Generally, the use of mint plant and mint essence is safe and classified as GRAS (Generally Regarded as safe) (22, 23).

Given that mint is safe and without certain side effects and interactions and that it is now commercially available in new forms, this study was performed to determine the effect of mint extract on the incidence and severity of nausea and vomiting after cesarean section under spinal anesthesia. This herb can be used as an effective treatment for reducing the incidence or severity of postoperative nausea and vomiting. On the other hand, the increasing demand for plant therapy and its low cost, led to a growing number of studies on this topic.

Materials and Methods

This double-blind, randomized, clinical trial was conducted in Bentolhoda Hospital of Bojnoord, Iran, in 2014. The subjects included all the pregnant women aged 15-45 years, who were referred to Bentolhoda Hospital of Bojnoord for delivery (all elective and emergency patients) and selected spinal anesthesia for cesarean section. Patients were alert, class I and class II according to America Society of Anesthesiology (ASA). Additionally, they did not have any infection, bleeding, or ulcers in the spinal area. The participants did not have any relative or absolute limitation for spinal anesthesia.

The exclusion criteria were drop in the fetal heart rate, placenta detachment, placenta previa, diabetes, an underlying gastrointestinal disease, weight > 90 kg, use of anti-nausea and anti-vomiting drugs 24 h pre-operative, not fasting, middle ear disease, more than 20% drop of blood pressure after spinal anesthesia form baseline, gestational hypertension, history of pelvic surgery except for caesarean section, and finally, history of nausea and vomiting during the past 24 hours.

Primarily, the patients were selected through convenient sampling method and then were randomly divided into two groups of intervention and control using table of random numbers.

After a full explanation of the project's method was given to the patients and written consent was obtained one hour before being put under spinal anesthesia for caesarean section. In the intervention group, 25 oral drops of Spearmint were added to 30 cc of tap water in a glass and was given to the patients. The control group received 30 cc of tap water in a glass. A questionnaire was completed for both groups.

Spinal anesthesia was performed with 75 mg of 5% lidocaine and a size 23 Quinke spinal needle in the L4-L5 lumbar spine of the patients in a supine position by a skilled anesthesiologist. After lying the patient on the operating bed and gaining precise control of blood pressure, the level of anesthesia was determined by a cotton soaked in alcohol after complete anesthesia. The amount of fluid required during operation was also calculated based on patient's need according to the standard methods. Ringer serum was used, and if necessary, other serums were available to be used.

Six liters of oxygen per minute was administered to the patients during the operation through a face mask.

Any nausea or vomiting and its severity were recorded during the Cesarean Section and in the recovery room.

The visual analogue scale was used to assess the severity of nausea. This objective tool included a 10-cm ruler that indicated a range of zero to ten that signified the severity of nausea being experienced. Zero represents no nausea is felt and 10 shows severe nausea is being experienced. Visual analogue scale for recording nausea severity was self-report.

Self-report scale is a well-suited, user friendly technique to measure severity of nausea. Nausea higher than 7 cm is classified as severe, between 3.5 and 7 as moderate, and less than 3.5 is considered as mild nausea. To assess the severity of vomiting, the frequency of retching and vomiting was counted.

Retching or vomiting more than five times was defined as severe, between three and five times was moderate, and less than three times was considered mild. After the Cesarean Section , the patients were transferred to the Cesarean Section ward. Two and four h after the patient had Cesarean Section the amount and severity of nausea along with vomiting was recorded using the aforementioned classification.

This clinical trial was approved by the Ethics Committee and a letter of introduction was presented by the School of Nursing and Midwifery, Bojnurd University of Medical Sciences for Bentolhoda Obstetrics and Gynecology Center.

Permission from the authorities was granted and the purpose and method of the project were explained to the administrators and staff. To investigate the distribution of quantitative data, Kolmogorov-Smirnov and Shapiro-Wilk tests were used.

To compare quantitative variables between two groups, independent t-test was run if normally distributed. Otherwise, Mann-Whitney test was performed, using SPSS Version $_{16}$. P-value less than 0.05 was considered statistically significant.

The standard sample size was calculated based on previous studies, with the assumption that the incidence rates of nausea in the control (as survival failure) and intervention groups were 0.7 and 0.4, respectively. Considering type I errorof 0.05 and a test power of 0.8, 46 patients were selected for each group.

Results

Findings of this study suggested that there was no significant relationship between the two groups in terms of maternal age, fasting and Cesarean Section duration, underlying disease, history of using opioids, smoking, as well as parities (P>0.05) .

Table 1 shows an inter-group comparison during different stages of assessment. Mean severity scores of nausea during cesarean section were 0.9±1.8 and 2.3±2.9 in the intervention and control groups, respectively.

The results of the independent t-test indicated that there was a significant link between the two groups in terms of mean severity score of nausea during cesarean section (P=0.007). Consequently, mean severity scores of nausea 2 and 4 h after Cesarean Section decreased in both groups.

The mean severity scores of nausea 2 and 4 h after Cesarean Section in the intervention were 0.4±1.4and0.05±0.3 and the control groups were 0.8±2.1, and 0.1±0.5, respectively. The results of independent t-test reflected no relationship between the two groups in terms of mean severity score of nausea 2 (P=0.234) and 4 h after Cesarean Section (P=0.588).

Table1: Comparison of mean severity scores of nausea between the two groups

severity of nausea			
Stages of assessment	Groups	Mean±SD	The results of independent-t intergroup test
During cesarean section	Intervention	0.9±1.8	T=2.71
	Control	2.3±2.9	P=0.007
Two hours after Cesarean Section	Intervention	0.4±1.4	T=1.1
	Control	0.8±2.1	P=..234
Four hours after Cesarean Section	Intervention	0.05±0.3	T=0.57
	Control	0.1±0.5	P=0.588

The results of Table 2 showed that during cesarean delivery, 33 patients in the intervention group and 22 in the control group did not suffer from nausea. Among the pregnant women undergoing caesarean section, 19.6% in the intervention group and 28.3% in the control group had nausea with mild severity.

The results of Table 3 illustrated that mean numbers of retching or vomiting during cesarean delivery were 0.4±0.9 and 1.5±1.9 in the intervention and control groups, respectively.

The results indicated that there was a significant relationship between the two groups in terms of mean number of retching during cesarean section (P=0.001).

However, 2 h after Cesarean Section , the frequency of retching diminished in the two groups, that is, mean number of retching 2 h after Cesarean Section decreased to 0.04±0.2 in the intervention group and 0.3±0.9 in the control group.

Independent t-test results demonstrated no significant link between the two groups at this stage (P=0.101).

The results of Table 4 revealed that during caesarean section, 26.1% of the patients in the intervention group and 52.2% in the control group had a feeling of retching that was with mild severity in most of the cases (10 patients in the intervention group and 17 in the control group had retching with mild severity).

At this stage, there was no case of retching with high severity in the intervention group. There was no sign of retching in both groups 4 h after Cesarean Section .

Table2: Descriptive statistics of the incidence of nausea in two groups

Total	Incidence and severity of nausea					Groups	Stages of assessment
	Severe	Moderate	Mild	None			
46	1	3	9	33	N	Intervention	During cesarean section
100	2.2	6.5	19.6	71.1	%		
46	5	6	13	22	N	Control	
100	10.9	13.0	28.3	47.8	%		
				P=0.001			
46	0	2	4	40	N	Intervention	2 hours after surgery
100	0	4.3	8.7	87.0	%		
46	1	2	5	38	N	Control	
100	2.2	4.3	10.9	82.6	%		
				P=0.46			
46	0	0	1	45	N	Intervention	4 hours after surgery
100	0	0	2.2	97.8	%		
46	0	0	2	44	N	Control	
100	0	0	4.3	95.7	%		
				P=0.68			

Table3: Comparison of mean number of retching in two groups

Mean number of retching			
The results of independent-t intergroup test	Mean±SD	Groups	Stages of assessment
T=3.41	0.4±.09	Intervention	During cesarean section
P=0.001	1.5±1.9	Control	
T=1.6	0.04±0.2	Intervention	2 hours after surgery
P=0.101	0.3±0.9	Control	
--	--	Intervention	4 hours after surgery
	--	Control	

Table4: Descriptive statistics of the number of retching in two groups

Total	The number of retching					Groups	Stages of assessment
	Severe	Moderate	Mild	None			
46	0	2	10	34	N	Intervention	During cesarean section
100	0	4.3	21.7	73.9	%		
46	3	4	17	22	N	Control	
100	6.5	8.7	37.0	47.8	%		
				P=0.001			
46	0	0	1	45	N	Intervention	2 hours after surgery
100	0	0	2.2	97.8	%		
46	0	1	4	41	N	Control	
100	0	2.2	8.7	89.1	%		
				P=0.57			
46	0	0	0	46	N	Intervention	4 hours after surgery
100	0	0	0	100	%		
46	0	0	0	46	N	Control	
100	0	0	0	100	%		
				P=1.00			

Discussion

The results of this study suggested that during cesarean section, the rate of nausea and vomiting was significantly lower in the intervention group than the control group. Moreover, 2 and 4 h after Cesarean Section , the rate of nausea decreased in both groups, but no significant difference was observed between the two groups. Two h after Cesarean Section , the frequency of vomiting reduced in both groups, while no significant difference was noted between then. Also, no signs of vomiting was observed in both groups 4 h after Cesarean Section .

The results of previous studies were in line with our findings. In the study performed by Fazel, the results showed that two groups (mint and saline) were significantly different in terms of eructation at third 20 minutes after the intervention that shows the higher

efficacy of the drug than the placebo. Their findings were consistent with ours as they showed that mint reduces postoperative nausea and vomiting.

The findings of the study by Nurodini reflected that oral use of mint extract reduces reversible gastric acid secretion in rats; they recommended its use in patients with gastrointestinal problems to reduce the use of antacids. The findings of Tate showed that peppermint can ameliorate postoperative nausea and vomiting, which is in agreement with our findings.

Lynn proposed that the severity of nausea decreased two to five min after aromatherapy with a mint. They concluded that aromatherapy effectively reduces the perceived severity of postoperative nausea (24).

Jamilian performed a study entitled as "Comparison of the effect of ginger, gabapentin, and ondancetron for prevention of nausea and vomiting after cesarean section by spinal anesthesia". In that study, the mean severity score of postoperative nausea and vomiting in three groups(group 1: Gingr, group 2: gabapentin and Group 3: ondansetron) was significantly lower than those of the placebo group, but no significant difference was observed between the three groups (25).

Westfall used anti-nausea plant including ginger, mint, and cannabis during pregnancy. The results showed that only ginger was effective as an anti-nausea drug in pregnancy, though all the three plants were effective for the treatment of other conditions such as nausea induced by chemotherapy and postoperative nausea. (26). The result of Westfall et al. are consistent with our findings.

The study of Sakhavar performed in Arak, Iran, showed that administration of ground cumin, instead of milk of magnesia after emergency cesarean section can lead to a significant reduction in the incidence of postoperative gastrointestinal complications (27).

Memishi evaluated the effect of carmint (a mixture of mint, lemon balm, and coriander) on the severity and frequency of gastrointestinal complications after cesarean delivery. The results of that study are in line with those of our study (28).

The results of previous studies are mainly consistent with the findings of the present study and confirm the effectiveness of mint in the prevention of nausea and vomiting during cesarean section and it has no side effects. Although intravenous analgesics are mainly administered for pain relief after Cesarean Section , they cause serious side effects such as nausea, vomiting, feeling over-medicated, and respiratory failure. The herbal medicines are commonly used to relieve pain after most surgeries in modern medicine, which not only reduces the use of chemical drugs, but also lowers the side effects. Herbal remedies have long been considered for use due to fewer side effects and are produced as well as marketed in various forms, especially herbal extracts. The limitation of the study was lack of cooperation of the nurses.

Conclusion

According to the findings of this study, mint is effective in the prevention of postoperative nausea and vomiting and no side effects associated with this plant have been noted. It seems that mint can be used as a safe drug for managing nausea. Future studies are recommended to compare this drug with other anti-nausea drugs in different surgeries with larger sample sizes.

Acknowledgement

This article was extracted from the research project approved by North Khorasan University of Medical Sciences. The authors appreciate the Deputy of Research of North Khorasan University of Medical Sciences, which provided the facilities for the implementation of this study and financiallysupported this paper.

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