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Application of chewing gum and lemon aromatherapy to reduce nausea and vomiting in post-cesarean section patients

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Abstract

Background: Postoperative nausea and vomiting following cesarean section (CS) can hinder patient recovery. Non-pharmacological interventions, such as chewing gum and lemon aromatherapy, may serve as supportive therapies to alleviate these symptoms.
Purpose: To determine the effectiveness of chewing gum and lemon aromatherapy in reducing nausea and vomiting in post-CS patients.
Method: This study used a Study Case Literature Review (SCLR) design involving two post-CS patients. The first patient received a 30-minute mint gum-chewing intervention, while the second received lemon aromatherapy. Symptoms were assessed using the Gordon Score before and after the interventions, with observations conducted for up to 120 minutes.
Results: Both patients' Gordon Scores decreased from 2 to 0 by the 120th minute. In the first case, the score decreased to 1 at 60 minutes and remained at 1 until 80 minutes. In the second case, the score decreased to 1 at 60 minutes. Both interventions showed potential to reduce nausea and vomiting.
Conclusion: Chewing mint gum and lemon aromatherapy may help reduce nausea and vomiting in post-CS patients.
Suggestion: Both interventions may be considered supportive therapies according to the patient's condition. Future studies should include more participants and use a comparative design.

Keywords: Chewing Gum; Lemon Aromatherapy; Nausea and Vomiting; Post-Cesarean Section.

INTRODUCTION

Delivery through cesarean section (CS) is a surgical procedure performed by making incisions in the abdominal wall and uterus to deliver the baby based on medical indications. According to a World Health Organization report, the use of CS continues to increase in various countries, with approximately 21% of all births worldwide being performed by cesarean section. This proportion is projected to increase to 29% by 2030 (Betran et al., 2021).

In Indonesia, the proportion of deliveries through CS is also relatively high. According to the 2023 Indonesian Health Survey (SKI), cesarean deliveries accounted for 25.9% of all births nationally. Meanwhile, the proportion in DKI Jakarta reached 40.8%. These figures indicate that CS has become a commonly used mode of delivery, particularly in urban areas such as Jakarta. This situation highlights the importance of improving the quality of perioperative and postoperative care, including the management of symptoms that may affect maternal comfort and recovery (Ministry of Health of the Republic of Indonesia, 2023).

One of the complaints commonly experienced by patients after undergoing CS is postoperative nausea and vomiting (PONV), which refers to nausea and vomiting occurring after surgery. PONV is a clinical concern because it can impair patient comfort, interfere with oral intake, and delay the recovery process. If not properly managed, repeated vomiting may also increase the risk of dehydration, electrolyte imbalance, aspiration, and discomfort around the surgical wound. PONV in patients undergoing CS

may affect mothers, infants, families, and healthcare services (Hailu et al., 2022).

PONV can be managed through pharmacological and non-pharmacological approaches. Pharmacological treatment involves the use of antiemetic drugs, such as metoclopramide, according to clinical indications and considerations (Hailu et al., 2022). However, patient management should not focus solely on medication but should also consider supportive interventions that can improve patient comfort. Non-pharmacological interventions can be used as complementary therapies to help reduce nausea and vomiting. These approaches include chewing gum, aromatherapy, acupressure, and relaxation techniques (Bagheri et al., 2026; Bowe et al., 2022; Qin et al., 2026).

One non-pharmacological intervention that can be applied is chewing mint gum. Chewing gum is a form of sham feeding, which involves stimulating chewing activity without introducing a substantial amount of food into the digestive tract. This activity can stimulate the cephalic-vagal response, which plays a role in digestive system activity. Such stimulation may help increase gastrointestinal motility and accelerate the recovery of gastrointestinal function after surgery (Djamaludin & Chrisanto, 2021). A previous randomized controlled trial involving 105 patients who underwent CS showed that the group receiving the chewing gum intervention experienced faster gastrointestinal recovery than the group receiving routine care (Bagheri et al., 2026).

Another non-pharmacological intervention is lemon aromatherapy through the inhalation of Citrus limon essential oil. Aromatherapy is a method of using essential oils through the sense of smell to promote relaxation and help reduce discomfort. Lemon has a fresh aroma that can provide patients with a sense of comfort. Olfactory stimulation is received through the olfactory system and can influence emotional responses and perceptions of comfort (Mascarenhas et al., 2025; Rafiei et al., 2026). A previous systematic review and meta-analysis involving 17 studies with a total of 1,490 participants found that aromatherapy could reduce the incidence of nausea in mothers after CS. The analysis showed a risk ratio of 0.52 (95% CI: 0.33–0.81) (Wang et al., 2025). Another study also reported similar findings, showing that the use of lemon aromatherapy in post-CS patients reduced the mean nausea and vomiting score from 4.8 to 2.3 following the intervention (Harfiyanto et al., 2024).

RESEARCH METHOD

This study employed a descriptive case study approach involving two post-cesarean section patients who experienced nausea and vomiting following surgery. The study focused on documenting changes in nausea and vomiting scores after the administration of two different non-pharmacological interventions: mint chewing gum and lemon aromatherapy. The interventions were administered separately to each participant, and the changes in symptoms were monitored over a 120-minute observation period. The study was conducted at BDT Mother and Child Hospital, South Jakarta, in August 2026. The participants consisted of two mothers who underwent cesarean section (CS) under spinal anesthesia. Participants were selected using purposive sampling based on predetermined inclusion and exclusion criteria.

The inclusion criteria were mothers who had delivered their first child, were aged 20–50 years, were in a conscious state (compos mentis), experienced nausea and vomiting during the perioperative period, and were willing to participate in the study. Participants were also required to have no history of allergies to mint chewing gum or lemon essential oil and no chewing, swallowing, or olfactory disorders.

Data were collected through direct observation, interviews, and documentation of midwifery care using the SOAP (Subjective, Objective, Assessment, and Planning) format. The severity of nausea and vomiting was assessed using an observation sheet based on the Gordon Score instrument. The Gordon Score consisted of four categories: a score of 0 indicated no nausea or vomiting; a score of 1 indicated nausea without vomiting; a score of 2 indicated retching or vomiting; and a score of 3 indicated nausea lasting more than 30 minutes accompanied by vomiting two or more times. Assessments were conducted before the intervention (pre-test) and at predetermined observation intervals over a 120-minute period to document changes in nausea and vomiting scores for each participant.

Two different non-pharmacological interventions were administered to the participants. The first participant received a mint chewing gum intervention. The participant was instructed to chew mint gum for

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30 minutes per session, with a total of four sessions conducted over the 120-minute observation period. The second participant received lemon aromatherapy through inhalation using a diffuser. The intervention involved mixing 10 drops of pure lemon essential oil with 200 mL of water. The diffuser was placed near the patient's bed to allow the participant to inhale the lemon aroma. The essential oil mixture was replenished every 60 minutes throughout the intervention period.

The collected data were analyzed descriptively by comparing the Gordon Scores recorded before and after each intervention. Changes in nausea and vomiting scores were presented separately for each participant to describe the symptom progression during the observation period. The findings were presented in tabular and narrative forms to illustrate changes in symptom severity over the 120-minute observation period.

RESEARCH RESULTS

Table 1. Frequency Distribution of Nausea and Vomiting Scores Before (Pre-test) and After (Post-test) the Chewing Gum and Lemon Aromatherapy Interventions in Post-Cesarean Section Patients (N=2)

Respondent	Nausea and Vomiting Scores				
	Pre-test	30 Minutes	60 Minutes	80 Minutes	120 Minutes (Post-test)
Mrs. T	2	2	1	1	0
Mrs. A	2	-	1	-	0
Averege	2,0	2,0	1,0	1,0	0

Based on Table the assessment of nausea and vomiting using the Gordon Score showed a decrease in scores in both participants following the non-pharmacological interventions of mint gum chewing and lemon aromatherapy. The decrease was observed from the initial assessment (pre-test) to the final assessment (post-test) at 120 minutes. At baseline, both participants had the same score of 2. The scores subsequently decreased to 0 by the end of the observation period.

In the first participant, Mrs. T, who received the mint gum-chewing intervention, the initial Gordon Score (pre-test) was 2. At the 30-minute assessment, the score remained at 2, indicating no change from the baseline measurement. At 60 minutes, the score decreased to 1 and remained at 1 until the 80-minute assessment. At the final assessment, 120 minutes after the intervention (post-test), the score decreased further to 0. Based on the observation results, there was an overall decrease of 2 points from baseline to the final assessment. These findings indicate a gradual reduction in the severity of nausea and vomiting during the mint gum-chewing intervention.

Meanwhile, the second participant, Mrs. A, who received lemon aromatherapy, had an initial Gordon Score (pre-test) of 2. At the 60-minute assessment, the score decreased to 1. At the final assessment, 120 minutes after the intervention (post-test), the score decreased further to 0. Thus, there was an overall decrease of 2 points from baseline to the final assessment. These findings indicate an improvement in Mrs. A's nausea and vomiting symptoms following the administration of lemon aromatherapy.

DISCUSSION

Nausea and Vomiting in Post-Cesarean Section Patients Before and After the Mint Gum-Chewing Intervention

The results in Mrs. T showed an improvement in the severity of nausea and vomiting following the mint gum-chewing intervention. Based on the Gordon Score assessment, the initial score (pre-test) was 2, indicating that the participant experienced retching or vomiting. At 30 minutes, the score remained at 2, indicating no improvement in symptoms. At 60 minutes, the score decreased to 1 and remained at this level until 80 minutes. A further decrease was observed at 120 minutes, when the score reached 0,

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indicating that the participant no longer experienced nausea or vomiting. Overall, the score decreased by 2 points from the initial to the final assessment. These findings indicate a gradual improvement in nausea and vomiting during the mint gum-chewing intervention.

The findings of this study are consistent with previous research suggesting an association between gum chewing and improvements in nausea and vomiting. A meta-analysis conducted with another found that gum chewing significantly reduced the incidence of postoperative vomiting (risk ratio 0.55; 95% CI 0.35–0.85; p = 0.007). The study also found that 30-minute gum-chewing sessions were more effective in reducing vomiting than 15-minute sessions (Liao et al., 2024). Another study reported a significant association between gum chewing and the incidence of PONV in patients undergoing cesarean section, with a p-value of 0.000 (Gustarina et al., 2024). Further research also indicates that gum chewing may accelerate gastrointestinal recovery in patients after cesarean section. A study involving 105 mothers who underwent cesarean section found that participants in the gum-chewing group experienced faster gastrointestinal recovery than those receiving routine care, including earlier passage of flatus and bowel movements (Bagheri et al., 2026).

Hysiologically, gum chewing is a form of sham feeding, in which chewing activity provides stimulation similar to eating without introducing food into the digestive tract. Chewing can stimulate the cephalic phase of digestion through activation of the vagal nerve pathway, which regulates parasympathetic activity (Handoyo et al., 2023). This stimulation may increase saliva production and digestive secretions, as well as stimulate electrical activity and muscle contractions in the gastrointestinal tract. Increased gastrointestinal activity may help accelerate the movement of intestinal contents and reduce postoperative impairment of intestinal motility. Therefore, gum chewing may help alleviate discomfort associated with slowed gastrointestinal motility after surgery (Hochner et al., 2015; Li et al., 2025; Tong et al., 2023).

Based on the study findings, the researchers assume that mint gum chewing may serve as a supportive non-pharmacological intervention to help reduce nausea and vomiting in post-cesarean section patients. This is reflected in the change in Mrs. T's score, which decreased from 2 to 1 at 60 minutes and eventually reached 0 at 120 minutes. The gradual decrease in the score during subsequent assessments suggests that improvements in the patient's condition may occur progressively throughout the observation period.

Nausea and Vomiting in Post-Cesarean Section Patients Before and After Lemon Aromatherapy Intervention

The results in Mrs. A showed a gradual reduction in the severity of nausea and vomiting following the administration of lemon aromatherapy through inhalation. Based on the Gordon Score assessment, the initial score (pre-test) was 2, indicating that the participant experienced retching or vomiting. Following the lemon aromatherapy intervention, the score decreased to 1 at 60 minutes. This decrease indicated an improvement from experiencing retching or vomiting to experiencing nausea without vomiting. Furthermore, at 120 minutes, the score decreased to 0, indicating that the participant no longer experienced nausea or vomiting. Overall, the study results showed a decrease of 2 points from the initial to the final assessment. These findings indicate a gradual improvement in nausea and vomiting during the observation period following the administration of lemon aromatherapy.

These findings are consistent with a previous study investigating the effectiveness of lemon essential oil aromatherapy in reducing nausea and vomiting among 30 post-cesarean section patients under spinal anesthesia at Slamet Riyadi Military Hospital, Surakarta. The study reported that the mean nausea and vomiting score decreased from 2.00 ± 0.742 before the intervention to 0.87 ± 0.730 after the administration of lemon aromatherapy (Handoyo et al., 2023). Another study, conducted through a systematic review and meta-analysis of 17 studies involving 1,490 mothers who underwent cesarean section, found that aromatherapy was associated with a reduction in the incidence of postoperative nausea, with a risk ratio of 0.52 (95% CI: 0.33–0.81; p = 0.004). This indicates that participants who received aromatherapy had a lower risk of experiencing nausea than those in the control groups (Wang et al., 2025).

Physiologically, lemon aromatherapy works through stimulation of the olfactory system. Lemon

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essential oil (Citrus limon) contains various volatile compounds, primarily limonene, as well as other compounds such as α-pinene and β-pinene. When the essential oil is inhaled, its aromatic molecules enter the nasal cavity and interact with olfactory receptors. These stimuli are transmitted through the olfactory nerve to the olfactory bulb and subsequently to several brain regions, including the limbic system, which plays a role in regulating emotions and responses to stress. The connection between the olfactory system and the limbic system allows aromas to influence mood, perceptions of comfort, and emotional responses (Safajou, et al., 2014; Zhang et al., 2026). Stimulation of the limbic system through the sense of smell is considered one of the mechanisms underlying the potential benefits of aromatherapy in reducing postoperative nausea (Wang et al., 2024).

In post-cesarean section patients, nausea and vomiting may be influenced by several factors, including the effects of spinal anesthesia, hypotension, the use of analgesics, and psychological conditions following surgery. In this context, inhalation of lemon aromatherapy may help provide a fresh and pleasant sensation. Pleasant olfactory stimulation may help reduce tension and anxiety, thereby potentially reducing the patient's perception of nausea.

Based on the study findings, the researchers assume that administering lemon aromatherapy through inhalation may help reduce nausea and vomiting in post-cesarean section patients. This is reflected in the change in Mrs. A's Gordon Score, which decreased from 2 before the intervention to 1 at 60 minutes and reached 0 at 120 minutes. This decrease indicates that the participant's symptoms gradually improved during the lemon aromatherapy intervention. The researchers suggest that inhaling the lemon aroma may provide a fresh and pleasant sensation, thereby helping reduce the perception of nausea during postoperative recovery.

CONCLUSION

The non-pharmacological interventions of mint gum chewing and lemon aromatherapy showed a reduction in nausea and vomiting scores based on the Gordon Score assessment. In the participant who received the mint gum-chewing intervention, the score decreased from 2 to 1 at 60 minutes and reached 0 at 120 minutes. Similarly, in the participant who received lemon aromatherapy, the score decreased from 2 to 1 at 60 minutes and reached 0 at 120 minutes. Both participants showed improvement, with no nausea or vomiting reported at the end of the observation period. These findings suggest that mint gum chewing and lemon aromatherapy may serve as supportive non-pharmacological interventions to help reduce nausea and vomiting in post-cesarean section patients.

SUGGESTION

Post-cesarean section patients are encouraged to use mint gum chewing and lemon aromatherapy as supportive therapies to help reduce nausea and vomiting after surgery, in accordance with healthcare professionals' recommendations. Hospitals are encouraged to consider implementing both interventions as part of postoperative care.

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