



EFFECTIVENESS OF PEPPERMINT AROMATHERAPY IN REDUCING THE INCIDENCE OF PONV IN POST-ANESTHESIA BONE PATIENTS

Fatimah*, Ikhsan Amran, Iswenti Novera, Yenni Elfira, Irwadi, Futi Hanna A'la

Department of Anesthesiologi Nursing, Faculty of Vocational, Universitas Baiturrahmah, Jl. By Pass, Aie Pacah, Padang, Sumatera Barat 25586, Indonesia

*fatimah@staff.unbrah.ac.id

ABSTRACT

Post Operative Nausea and Vomiting (PONV) is a common complication after surgery with spinal anesthesia, with an incidence reaching 20–30%. PONV can prolong hospitalization, increase treatment costs, and reduce patient comfort. Peppermint aromatherapy is an effective, easy, and patient-accepted alternative to reduce PONV symptoms. Peppermint contains menthol which is carminative and antispasmodic, and can provide a relaxing effect through stimulation of the central nervous system. Objective to determine the effect of peppermint aromatherapy on the incidence of PONV in patients after spinal anesthesia. Method: This study was a quasi-experiment with a pre and post test design without control. Thirty post-spinal anesthesia patients were given peppermint aromatherapy, then PONV incidence was measured before and after the intervention using the Gordon scale. Data analysis used the Wilcoxon test. Results: Peppermint aromatherapy has been proven to be effective in reducing the incidence of PONV in patients after spinal anesthesia. Of the 30 respondents, the majority experienced nausea (73.3%) and vomiting (26.7%) before the intervention. After aromatherapy, 36.7% did not experience symptoms, and only 6.7% still vomited. The Wilcoxon test showed a significant difference ($p = 0.000$), indicating that peppermint aromatherapy was statistically effective in reducing PONV. Conclusions: Peppermint aromatherapy is effective in reducing the incidence of PONV in post-spinal anesthesia patients, as indicated by a decrease in nausea and vomiting symptoms after the intervention.

Keywords: aromatherapy; ponv; spinal anesthesia

How to cite (in APA style)

Fatimah, F., Amran, I., Novera, I., Elfira, Y., Irwadi, I., & A'la, F. H. (2025). Effectiveness of Peppermint Aromatherapy in Reducing the Incidence of PONV in Post-Anesthesia Bone Patients. *Indonesian Journal of Global Health Research*, 7(5), 143-150. <https://doi.org/10.37287/ijghr.v7i5.6550>.

INTRODUCTION

Surgical procedures are one of the essential medical interventions in modern healthcare, aimed at saving lives, preventing disabilities, and avoiding potentially life-threatening complications (Klase et al., 2016, Amirshahi et al., 2020). Along with the growing need for surgical interventions, the use of anesthesia as an integral part of surgery has also increased. One commonly used type of anesthesia is spinal anesthesia, known for its effectiveness in blocking pain without inducing loss of consciousness. However, spinal anesthesia is not without risks and may lead to both major and minor complications. One of the most frequently occurring minor complications is Post Operative Nausea and Vomiting (PONV) (Oroh et al., 2022).

PONV refers to the condition of nausea and vomiting that occurs within the first 24 hours after surgery, with a reported prevalence of 20–30% among general surgical patients (Sudjito & Setyawati, 2018). Although considered a mild complication, PONV can significantly affect patient comfort, extend hospitalization time, increase the risk of secondary complications such as dehydration, electrolyte imbalance, wound dehiscence, and even rupture of surgical sutures, ultimately leading to increased healthcare costs. According to medical records at Dr. Reksodiwiryo Level III Hospital in Padang, during the period from April to June 2024, out of 853 surgical procedures, 374 were performed using spinal anesthesia. A preliminary study revealed that 6 out of 10 patients undergoing spinal anesthesia experienced PONV, yet no

non-pharmacological interventions have been implemented at the facility (Millizia et al., 2022).

Currently, complementary therapies are gaining attention as easy, affordable, and safe non-pharmacological methods to manage PONV. One promising complementary therapy is peppermint aromatherapy. The main active compound in peppermint, menthol, has carminative and antispasmodic properties and acts on the central nervous system by stimulating the limbic system, resulting in relaxation and a reduction in nausea and vomiting. Previous studies have shown the effectiveness of peppermint aromatherapy in reducing nausea in cancer patients undergoing chemotherapy and pregnant women experiencing nausea during their first trimester. However, research on the specific use of peppermint aromatherapy in patients following spinal anesthesia remains limited (Hayati, 2019., Stea et al., 2014., Ayubbana & Hasanah, 2021). Given the high incidence of PONV and the absence of non-pharmacological interventions at Dr. Reksodiwiryo Level III Hospital, this study is deemed important to evaluate the effectiveness of peppermint aromatherapy as an alternative nursing intervention in anesthesiology. The findings of this study are expected to contribute to improving the quality of nursing care and enhancing postoperative patient comfort. Therefore, the researcher purpose is in investigating the effect of peppermint aromatherapy on the incidence of PONV in patients after spinal anesthesia at Dr. Reksodiwiryo Level III Hospital in Padang.

METHOD

This study employed a Quasi-Experimental design with a pre- and post-test without control group approach. This means a single group of 30 patients undergoing spinal anesthesia was observed (O1) before receiving an intervention (X1), and then observed again (O2) after the intervention. The sampling method chosen by the researcher uses the non-probability sampling method (non random sample). The independent variable was peppermint aromatherapy, and the dependent variable was Postoperative Nausea and Vomiting (PONV), measured using the Gordon scoring scale (0-3). The research was conducted at the post-operative or recovery room (RR) of RS Tingkat III dr. Reksodiwiryo Padang, from December 2024 to May 2025. Non-probability sampling was used, selecting 30 patients based on specific inclusion (age 17-65, ASA 1 and 2, willing to participate) and exclusion criteria (olfactory disorders, antiemetic medication, peppermint allergy). Data were collected through direct observation using a checklist and an observation sheet. Analysis involved univariate analysis for respondent characteristics and bivariate analysis using the Wilcoxon Signed-Rank Test to determine the effect of peppermint aromatherapy on PONV, as the data was not normally distributed.

RESULT

Table 1 shows that among the 30 respondents in the control group who experienced PONV after undergoing surgery with spinal anesthesia, the majority were in the 26–35 year age group (early adulthood), accounting for 11 individuals (36.7%). Based on gender, females dominated the cases of PONV with 20 individuals (66.7%), while males accounted for 10 individuals (33.3%). Furthermore, in terms of smoking history, most respondents who experienced PONV had no history of smoking, totaling 23 individuals (76.7%), whereas 7 individuals (23.3%) did have a smoking history. Based on PONV history, 25 respondents (83.3%) had no previous history of PONV, and only 5 respondents (16.7%) had experienced it previously.

Table 1.
Frequency Distribution of Respondent Characteristics Based on Age, Gender, Smoking History, and PONV History

Respondent Characteristics	PONV (n)	%
Age (years)		
Late Adolescence (17–25)	3	10
Early Adulthood (26–35)	11	36.7
Late Adulthood (36–45)	8	26.7
Early Elderly (46–55)	5	16.7
Late Elderly (56–65)	3	10
Gender		
Male	10	33.3
Female	20	66.7
Smoking History		
Yes	7	23.3
No	23	76.7
PONV History		
Yes	5	16.7
No	25	83.3

Table 2.
Frequency Distribution of PONV Incidence Before Peppermint Aromatherapy Administration

Gordon Score	Description	f	%
0	No nausea, no vomiting	0	0
1	Nausea	22	73.3
2	Retching/Vomiting	8	26.7
3	Nausea ≥ 30 minutes and vomiting ≥ 2 times	0	0

Table 2 indicates that most respondents experienced nausea before receiving the peppermint aromatherapy intervention, with 22 out of 30 respondents (73.3%) experiencing nausea (Gordon score 1), and 8 respondents (26.7%) experiencing vomiting or retching (Gordon score 2). No respondents experienced severe conditions such as nausea for ≥ 30 minutes with vomiting ≥ 2 times (score 3), nor were there respondents without any symptoms (score 0). This suggests that prior to the administration of peppermint aromatherapy, most respondents experienced mild to moderate PONV symptoms.

Table 3.
Frequency Distribution of PONV Incidence After Peppermint Aromatherapy Administration

Gordon Score	Description	f	%
0	No nausea, no vomiting	11	36.7
1	Nausea	17	56.7
2	Retching/Vomiting	2	6.7
3	Nausea ≥ 30 minutes and vomiting ≥ 2 times	0	0

Table 3 shows that following the administration of peppermint aromatherapy, there was a decrease in the number of respondents experiencing PONV symptoms. A total of 11 respondents (36.7%) no longer experienced nausea or vomiting (score 0), and 17 respondents (56.7%) still experienced nausea (score 1). Only 2 respondents (6.7%) continued to experience vomiting or retching (score 2), and none experienced severe symptoms (score 3). These findings indicate an improvement in PONV symptoms in most respondents after the peppermint aromatherapy intervention, particularly evidenced by an increased number of respondents free from nausea and vomiting.

Table 4.
Normality Test Results

	Shapiro-Wilk			Data are not normally distributed
	Statistic	df	Sig.	
PONV Score Before Intervention	0.554	30	.000	
PONV Score After Intervention	0.751	30	.000	

Normality testing was performed using the Shapiro-Wilk test, as shown in Table 4.4. The results showed that the PONV score before the intervention had a significance value of 0.000 with a Shapiro-Wilk statistic of 0.554. Similarly, the PONV score after the intervention had a significance value of 0.000 and a Shapiro-Wilk statistic of 0.751. Since the significance values of both variables are less than 0.05 ($p < 0.05$), it can be concluded that the data are not normally distributed. Therefore, the difference analysis was conducted using a non-parametric test, specifically the Wilcoxon Signed Rank Test.

Table 5.
Wilcoxon Signed Rank Test Results for PONV Incidence Before and After Peppermint Aromatherapy

Test Result	Value
Z-Value (Pre- and Post-Intervention)	-4.123
Asymp. Sig. (2-tailed)	0.000

The Wilcoxon Signed Rank Test was used to assess the difference in PONV incidence before and after the peppermint aromatherapy intervention. As shown in Table 4.5, the analysis yielded a Z value of -4.123 with an Asymp. Sig. (2-tailed) value of 0.000. Since the p-value is less than 0.05, it can be concluded that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. This indicates a statistically significant difference or effect in PONV incidence before and after the peppermint aromatherapy intervention. Thus, peppermint aromatherapy has a significant effect in reducing the incidence of PONV in patients after spinal anesthesia.

DISCUSSION

Characteristics of Respondents

Age

The incidence of Postoperative Nausea and Vomiting (PONV) in patients after spinal anesthesia in this study shows that out of 30 respondents, the 26–35 year age group (early adulthood) experienced PONV the most, totaling 11 individuals (36.7%). This finding is consistent with research by Mulyasih and Ching Cing (2024), where among 80 respondents studied, the early adulthood age group (26–35 years) dominated PONV incidence in patients undergoing spinal anesthesia. Physiologically, the mechanism of PONV is complex and not fully understood, especially in adults. Age is a statistically significant risk factor for PONV, with a tendency for incidence to decrease with increasing age. Nevertheless, individuals in early adulthood and late elderly age groups still have a relatively higher risk. This can be linked to physiological changes in the gastrointestinal system and differences in hormonal responses to perioperative stress. In early adulthood, increased stress hormones like cortisol released during surgical procedures can affect the central nervous system, triggering PONV (Millizia et al., 2021).

Gender

This study's results indicate that the majority of respondents who experienced PONV after spinal anesthesia were **female**, accounting for 20 individuals (66.7%). This finding aligns with research by Widyanti et al. (2024) on PONV risk factors based on Koivuranta assessment in neurosurgical patients. That study found that 12 female respondents experienced PONV, while only 1 male respondent experienced a similar condition, showing

that gender is a significant determinant in PONV incidence. Physiologically, females produce estrogen and progesterone hormones, which are closely linked to neurotransmitters like serotonin (5-HT₃) and dopamine (D₂). Both are part of the neurochemical system that affects the Chemoreceptor Trigger Zone (CTZ) and the vomiting center in the medulla oblongata. This condition causes the CTZ in females to be more sensitive to stimuli that trigger nausea and vomiting. Female gender within the first 24 hours post-surgery is a significant predictor for PONV. This risk is reported to be two to three times higher compared to males. This can be explained by hormonal influences such as increased levels of estrogen, progesterone, and gonadotropins, which play a role in increasing the sensitivity of the CTZ and vomiting center (Mardhiah, 2021).

Smoking History

The study found that regarding smoking history, most respondents who experienced PONV did not have a history of smoking, totaling 23 respondents (76.7%). This result aligns with Mardhiah's (2021) study, which found that respondents with a smoking history experienced less PONV (40%) than non-smoking respondents (60%). There's a protective effect of smoking against PONV, possibly due to the induction of CYP1A2 and CYP2E1 enzymes by polycyclic aromatic hydrocarbons in cigarette smoke. The chemicals in cigarette smoke lead to increased metabolism of some drugs used in anesthesia (Farhat et al., 2021). Cigarettes contain psychoactive substances like nicotine that affect the nervous system and brain. Smokers develop tolerance, an adaptation to initial sensations like nausea, vomiting, or dizziness felt when first smoking. This state of tolerance leads to addiction or dependence on nicotine. The same was stated in a systematic review: individuals with a smoking history are more resistant to nausea and vomiting and can reduce the risk of PONV due to the protective effect of smoking caused by functional changes in neuroreceptors from chronic nicotine exposure (Apfel et al., 2012).

History of PONV

The study found that regarding previous PONV history, most respondents who experienced PONV **did not have a history of PONV**, totaling 25 respondents (83.3%). This finding contradicts several studies that state a history of PONV is a significant risk factor for PONV. In research on using the Koivuranta assessment to evaluate PONV risk factors in neurosurgical patients, the results showed that a history of PONV had a significant association with PONV incidence, with a p-value of 0.01. This confirms that patients with a previous history of PONV are at higher risk of experiencing PONV post-surgery (Widyanti et al., 2024). Physiologically, a history of PONV reflects an individual's predisposition to postoperative nausea and vomiting. This can be due to increased sensitivity of the chemoreceptor trigger zone (CTZ) in the medulla oblongata, which is influenced by neurotransmitters like serotonin (5-HT₃) and dopamine (D₂). The CTZ is located in the area postrema, outside the blood-brain barrier, making it more easily exposed to emetic substances in blood circulation. When the CTZ is stimulated by emetic agents, such as anesthetics or certain medications, it sends signals to the brain's vomiting center, triggering nausea and vomiting. Patients with a history of PONV may have a more sensitive neurochemical response to anesthesia or surgical stimuli, increasing the likelihood of PONV. However, in this study, the majority of respondents who experienced PONV did not have a previous history, suggesting that other factors such as gender, age, or type of surgery might be more dominant in triggering PONV (Macdougall & Sharma, 2019).

Incidence of PONV After Spinal Anesthesia Before Peppermint Aromatherapy Administration

The incidence of PONV in patients after spinal anesthesia before the administration of peppermint aromatherapy showed that most experienced PONV in the nausea category with a

Gordon score **of 1**, totaling 22 respondents (73.3%) out of 30 total respondents. Additionally, 8 respondents (26.7%) were in the retching/vomiting category with a Gordon score of 2. This indicates that most patients experienced mild to moderate PONV symptoms before the intervention. These findings align with research by Lestishiyami & Lintang (2024), who reported that the majority of patients after spinal anesthesia experienced mild nausea. That study also affirmed that spinal anesthesia still carries a risk of PONV, although lower than general anesthesia. Physiologically, PONV after spinal anesthesia can be explained by several mechanisms. Spinal anesthesia blocks the sympathetic nervous system, causing vasodilation and hypotension, which ultimately reduces perfusion to the gastrointestinal system and the vomiting center in the medulla oblongata. This hypotension is one of the main triggers of nausea after spinal anesthesia (Gan et al., 2014). Additionally, activation of serotonin (5-HT₃) receptors in the gastrointestinal tract, due to surgical procedures and anesthesia, can also stimulate afferent vagal fibers to the vomiting center, thereby triggering PONV (Apfel et al., 2012). The addition of intrathecal adjuvant drugs like opioids (e.g., morphine) in spinal anesthesia also contributes to nausea and vomiting because they act directly on the chemoreceptor trigger zone (CTZ) in the medulla oblongata. This mechanism explains why even if not all patients have a history of PONV, they still experience these symptoms after spinal anesthesia (Apfel et al., 2012).

Incidence of PONV After Spinal Anesthesia Following Peppermint Aromatherapy Administration

The incidence of PONV in patients after spinal anesthesia following the administration of peppermint aromatherapy showed a decrease in the incidence and intensity of PONV. A total of 11 respondents (35.7%) fell into the no nausea, no vomiting category with a Gordon score of 0. The nausea category had 17 respondents (56.7%) with a Gordon score of 1. Then, the retching/vomiting category had 2 respondents (6.7%). This decrease aligns with research by Rustanti et al. (2019), which demonstrated that inhaled peppermint aromatherapy is effective in reducing nausea and vomiting in postoperative patients with spinal anesthesia. That study found that peppermint aromatherapy could significantly reduce the intensity of nausea and vomiting compared to the control group. Physiologically, peppermint contains active compounds like menthol, which have antiemetic effects. Menthol works by stimulating cold receptors in the nose and throat, which then send signals to the central nervous system to reduce the sensation of nausea. Additionally, menthol also has a relaxing effect on the smooth muscles of the gastrointestinal tract, which can help reduce symptoms of nausea and vomiting. Thus, the administration of peppermint aromatherapy by inhalation can be considered an effective non-pharmacological intervention in reducing the incidence and intensity of PONV in patients after spinal anesthesia.

Effect of Peppermint Aromatherapy on PONV in Patients After Spinal Anesthesia

The effect of peppermint aromatherapy on the incidence of PONV in patients after spinal anesthesia at RS Tingkat III dr. Reksodiwiryo Padang showed the following research results: the incidence of PONV after spinal anesthesia before the administration of peppermint aromatherapy fell into the nausea category with a Gordon score of 1, totaling 22 respondents (73.3%). Additionally, 8 respondents (26.7%) were in the retching/vomiting category with a Gordon score of 2 out of a total of 30 respondents. After the administration of peppermint aromatherapy to PONV patients after spinal anesthesia, the results showed the no nausea and vomiting category with a Gordon score of 0 for 11 respondents (35.7%). The nausea category had 17 respondents (56.7%) with a Gordon score of 1. Then, the retching/vomiting category had 2 respondents (6.7%). After performing a statistical test using the Wilcoxon Signed-Rank Test, an Asymp Sig value of 0.000 ($P < 0.05$) was obtained, which means that H_0 is rejected and H_a is accepted, indicating a significant effect of peppermint aromatherapy administration on the incidence of PONV in patients after spinal anesthesia. This finding is consistent with

research by Taufan Arif et al. (2024), which showed that peppermint aromatherapy is effective in reducing the level of nausea and vomiting in postoperative patients with spinal anesthesia.

Peppermint aromatherapy contains active compounds such as menthol, menthone, and menthyl acetate, which have antiemetic effects. Menthol works by stimulating cold receptors in the nose and throat, which then send signals to the central nervous system to reduce the sensation of nausea. Additionally, menthol also has a relaxing effect on the smooth muscles of the gastrointestinal tract, which can help reduce symptoms of nausea and vomiting. The mechanism of action of peppermint aromatherapy also involves influencing the limbic system of the brain, which plays a role in regulating emotions and stress responses. Thus, inhaling the aroma of peppermint can provide a calming effect and reduce the perception of nausea in patients (Ayubbana & Hasanah, 2021).

CONCLUSION

Peppermint aromatherapy significantly reduces Postoperative Nausea and Vomiting (PONV) in patients after spinal anesthesia. A study of 30 respondents showed a decrease in nausea and vomiting symptoms after the intervention. Early adulthood and female gender were risk factors for PONV, while smoking history showed a protective effect. These findings support peppermint as an effective non-pharmacological intervention to improve patient comfort.

REFERENCES

- Amirshahi, M., Behnamfar, N., Badakhsh, M., Rafiemanesh, H., Keikhaie, K., Sheyback, M., & Sari, M. (2020). Prevalence of postoperative nausea and vomiting: A systematic review and meta-analysis. *Saudi Journal of Anaesthesia*, 14(1), 48–56. https://doi.org/10.4103/sja.SJA_401_19
- Arif, T., Ciptaningtyas, M. D., Mudviyanti, N. N., & Solikhah, F. K. (2024). Reduction of Postoperative Nausea and Vomiting Induced by Spinal Anesthesia: Peppermint and Lavender Aromatherapies as Complementary Therapies. *Folia Medica Indonesiana*, 60(4), 281–287. <https://doi.org/10.20473/fmi.v60i4.58836>
- Apfel, C. C., Heidrich, F. M., Jukar-Rao, S., Jalota, L., Hornuss, C., Whelan, R. P., Zhang, K., & Cakmakaya, O. S. (2012). Evidence-based analysis of risk factors for postoperative nausea and vomiting. *British Journal of Anaesthesia*, 109(5), 742–753. <https://doi.org/10.1093/bja/aes276>
- Ayubbana, S., & Hasanah, U. (2021). Efektifitas aromaterapi peppermint terhadap muntah pada pasien kanker payudara yang menjalani kemoterapi. *Holistik Jurnal Kesehatan*, 15(1), 1–7. <https://doi.org/10.33024/hjk.v15i1.3313>
- Farhat, K., Waheed, A., Pasha, A. K., Iqbal, J., & Mansoor, Q. (n.d.). Effect Of Smoking On Nausea , Vomiting And Pain. 28(3), 277–281.
- Gan, T. J., Diemunsch, P., Habib, E. S., Kovac, A., Kranke, P., Meyer, T. A., ... & Watcha, M. (2014). Consensus guidelines for the management of postoperative nausea and vomiting. *Anesthesia & Analgesia*, 118(1), 85–113.
- Hayati, F. K. (2019). Pengaruh Pemberian Aromaterapi Peppermint Terhadap Nausea Pada Pasien Post Operasi Sectio Caesarea Dengan Anestesi Spinal Oleh : Fitri Kurnia Hayati Abstrak. *Journal of Chemical Information and Modeling*, 53(9), 1689–1699.

- Klase, S., Pinzon, R. T., & Meliala, A. (2016). Penerapan Surgical Safety Checklist Who Di Rsud Jaraga Sasameh Kabupaten Barito Selatan. *Berkala Ilmiah Kedokteran Duta Wacana*, 1(3), 173. <https://doi.org/10.21460/bikdw.v1i3.25>
- Lestishiyami, L., & Lintang, R. (2024). Faktor-Faktor Yang Berhubungan Dengan Kejadian Ponv Pada Pasien Pasca Anestesi Umum Di Rumah Sakit Islam Banjarnegara Lesy. 10(April), 689–695.
- Macdougall, M. R., & Sharma, S. (2019). Physiology , Chemoreceptor Trigger Zone.
- Mardhiah, A. (2021). Faktor Yang Meningkatkan Kejadian Post-Operative Nausea And Vomiting (Ponv) Pada Pasien Laparatomi. 4(2), 58–69.
- Millizia, A., Sayuti, M., & , Triana Puti Nendes, M. B. R. (2021). Faktor-Faktor Yang Berhubungan Dengan Kejadian Postoperative Nausea And Vomiting Pada Pasien Anestesi Umum Di Rumah Sakit Umum Cut Meutia Aceh Utara. 7(2), 13–23.
- Millizia, A., Yudhi Iqbal, T., & Futtaqi, P. (2022). Perbedaan Sensitivitas Spesifisitas Skor Apfel Dan Skor Koivuranta Sebagai Prediktor Kejadian PONV Dengan Anestesi Umum. *COMSERVA Indonesian Jurnal of Community Services and Development*, 2(6), 874–883. <https://doi.org/10.59141/comserva.v2i6.417>
- Mulyasih, A. A. R., & Ching Cing, M. T. G. (2024). Hubungan Usia dan Lama Pembedahan dengan Kejadian Ponv Pada Pasien dengan Anestesi Spinal di RSUD 45 Kuningan. *MAHESA : Malahayati Health Student Journal*, 4(1), 155–167. <https://doi.org/10.33024/mahesa.v4i1.12388>
- Oroh, A., Yudono, D. T., & Siwi, A. S. (2022). Pengaruh Elevasi Kaki Terhadap Tekanan Darah Pada Pasien Sectio Caesaria Dengan Spinal Anestesi Di Instalasi Kamar Bedah Rumah Sakit Tk.Ii Robert Wolter Mongisidi Manado. *Jurnal Inovasi Penelitian*, Vol.3 No.7(7), 6857–6864.
- Rustanti, M. (2019). Pengaruh Pemberian Aromaterapi Peppermint Terhadap Mual Muntah Pasca Operasi Spinal Anestesi Di Rsud Kota Yogyakarta. Skripsi: Poltekkes Kemenkes Yogyakarta
- Stea, S., Beraudi, A., & De Pasquale, D. (2014). Essential oils for complementary treatment of surgical patients: State of the art. *Evidence-Based Complementary and Alternative Medicine*, 2014. <https://doi.org/10.1155/2014/726341>
- Sudjito, M. H., & Setyawati, T. (2018). Continuing Professional Development Akreditasi PP IAI-2 SKP Kejadian Mual Muntah Pasca-Laparatomi (PONV) setelah Pemberian Granisetron Dibandingkan setelah Pemberian Kombinasi Ondansetron-Deksametason. 45(3), 172–175.
- Widyanti, I. N., Keperawatan, J., Kesehatan, P., & Yogyakarta, K. (2024). Faktor risiko ponv menurut assesment koivuranta pada pasien bedah saraf. 18(3), 115–122. <https://doi.org/10.36082/qjk.v18i2>