



Dose Ginger Have Preventative Effects on PONV-Related Eye Surgery? A Clinical Trial

Shahnam Sedigh Maroufi¹, Parisa Moradimajd^{1*}, Seyed Ali Akbar Moosavi², Farnad Imani³, Hamidreza Samaee⁴ and Mehmet Oguz⁵

¹Department of Anesthesia, Iran University of Medical Sciences, Tehran, Iran

²Department of Molecular Biology, Iran University of Medical Sciences, Tehran, Iran

³Pain Research Center, Iran University of Medical Sciences, Tehran, Iran

⁴Mazandaran University of Medical Sciences, Sari, Iran

⁵Vocational Health College of Mardin Artuklu University, Mardin, Turkey

*Corresponding author: Ph.D. of Health in Emergency and Disasters, Iran University of Medical Sciences, Tehran, Iran. Email: moradimajd.p@gmail.com

Received 2019 April 08; Revised 2019 August 31; Accepted 2019 September 18.

Abstract

Background: Postoperative nausea and vomiting (PONV) is considered a common complication of anesthesia, which, particularly in eye surgery, may exert pressure on stitches and open or leak the surgical wound, leading to bleeding.

Objectives: We aimed to study the effect of ginger on PONV and changes in vital signs after eye surgery.

Methods: In this triple-blind randomized controlled trial, 120 candidate patients for eye surgery were divided into group A (n = 40) and group B (n = 40). Patients in group A received the capsules of ginger 1 g while patients in group B received a placebo one hour before the procedure with 30 mL water. The incidence of nausea and the frequency of vomiting were evaluated at 0, 15, 30 minutes, and 2 hours after the operation. Also, the vital signs of the participants were recorded at certain times.

Results: The results demonstrated a statistically significant difference in the frequency of nausea between group A and group B ($P < 0.05$). The severity of nausea was lower in group A than in group B immediately and 2 hours after recovery ($P < 0.05$). The incidence of vomiting was significantly lower in group A than in group B ($P < 0.05$). The vital signs were not significantly different between group A and group B ($P > 0.05$).

Conclusions: Ginger was effective in the prevention of PONV after eye surgery but had no impact on vital signs. Hence, ginger is proposed to use as a low-cost, prophylactic measure for PONV reduction.

Keywords: Ginger, Nausea, Vomiting, Eye Surgery, PONV

1. Background

Postoperative nausea and vomiting (PONV) is a common anesthesia-related complication that can occur in many surgical procedures such as eye surgery (1-5). PONV is an unpleasant GI complication that exerts pressure on stitches and opens or leaks the surgical wound, thereby leading to bleeding (6-9). More than one-third of delays in postoperative patient discharge is caused by PONV (10-14).

Nowadays, various strategies including complementary medicine are used to control the condition (15-19). Herbal medicine has been used for thousands of years as a complementary treatment in different countries worldwide (20-22). According to the WHO, more than 80% of the world population is currently using herbal extracts, with more prevalence in undeveloped than in developed countries (23). Garlic, mint, and ginger are commonly used to treat nausea and vomiting (24). Moreover, *Zingiber of-*

ficinale rhizome (ginger) as the ginger root is an herbal plant containing many active biological compounds such as Gingerols and Shogaols. These compounds can have anti-nausea, sedative, anti-inflammatory, anticancer, and prostaglandin reducing effects (24).

Since a number of studies have shown that PONV commonly occurs after eye surgery (25, 26) and contradictory results exist about the ginger effects on PONV (6, 8, 18), as well as considering the sedative effects of ginger and its potential impact on vital symptoms such as hypotension, this study aimed to explore the effect of ginger on PONV and vital signs in patients undergoing eye surgery.

2. Methods

This was a triple-blind clinical trial. The inclusion criteria included the lack of cancer, an age of 18 - 60 years, lack

of pregnancy, ability to take the capsules, platelets count of > 100000 , free from conditions such as GI obstruction, seizure, hepatitis, diabetes, kidney disorders, allergy to the ginger root, voiding drugs for corticosteroid, nausea and vomiting, and no history of smoking. A total of 80 patients were randomly selected to undergo eye surgery, meeting the criteria and being willing to participate in the study. The study design was based on the consort 2010 flow diagram (Figure 1). Samples and medical consent were taken based on ethical code 101568 from the Iran University of Medical Sciences (IUMS) and IRCT code 2014060918020N1 from www.irct.ir.

Ginger capsules (1000 mg) were prepared at a pharmacology lab and placebos were made with identical shapes such that they could not be differentiated easily. Both ginger and placebo capsules were administered randomly. Patients were divided into two groups of A and B. Group A received a single ginger dose of 1000 mg and group B received a placebo with 30 mL water before surgery. Based on anesthesia expertise, conditions such as medication type, administration, and duration of anesthesia were the same among all participants. The medication of anesthesia induction included midazolam 2 mg, fentanyl $2 \mu\text{g}/\text{kg}$, thiopental 5 mg/kg, and atracurium 0.5 mg/kg. Moreover, 50% oxygen, 50% N_2O were used for the maintenance of anesthesia. We did not use medications that could cause nausea and vomiting such as morphine. Also, all patients received 500 mL of normal saline. Injectable ondansetron was used if patients needed anti-nausea medication.

To evaluate nausea, we used a 10 cm linear analog scale that ranged from 0 to 10; scores 0, 1 - 3, 4 - 6, 7 - 9, and 10 were assigned to no, mild, moderate, severe, and very severe nausea, respectively. Vomiting was defined as a severe gastrointestinal stimulation, which caused the forceful discharge of the contents of the digestive tract from the mouth (20). The number of vomiting episodes was recorded (21). Using a premade checklist, the severity and frequency of PONV were measured by an investigator, unaware of the treatment regimen, immediately, 15 min, 30 minutes, and 2 hours after recovery. Additionally, the vital signs included the heart rate, systolic and diastolic pressure, respiratory rate assessed 30 minutes before anesthesia induction and 30 minutes after recovery. All collected data were analyzed by SPSS V. 21, using a *t*-test and chi-square test.

3. Results

Overall, 80 subjects participated in the study. The study results indicated that 40% of the participants in group A were female and 60% were male, and in group B, 51.5% of the participants were female and 48.5% were male. The

mean age was 36.24 ± 2.17 in group A and 36.24 ± 2.49 in group B. The mean weight was 70.68 ± 2.09 in group A and 70.06 ± 2.22 in group B. No significant difference was found concerning age, gender, and weight between the two groups ($P > 0.001$).

As shown in Table 1, four patients (10%) in group A reported nausea compared to 10 patients (40%) in group B ($P < 0.005$). The visual analog scores of nausea immediately, 15 minutes, 30 minutes, and 2 hours after recovery were lower in group A than in group B. The differences were statistically significant at immediate ($P = 0.03$) and 2 hours after recovery ($P = 0.02$) between the two groups. The number of patients with vomiting was significantly lower in group A ($n = 0, 0\%$) than in group B ($n = 10, 40\%$) ($P < 0.001$) (Table 2).

As shown in Table 3, the comparison of vital signs (heart rate, systolic and diastolic pressure, and respiratory rate) revealed no significant difference between the two groups ($P > 0.5$).

4. Discussion

PONV has always been regarded as the most unpleasant sequel of anesthesia, especially after eye surgery. This study was conducted to evaluate the effect of ginger on PONV and vital signs after eye surgery.

The present study results indicated that ginger could significantly reduce the incidence of nausea ($P < 0.005$). Also, ginger significantly reduced the severity of nausea immediately and 2 hours after recovery in patients undergoing eye surgery ($P < 0.005$). Seidi et al. in 2017 (18) and Al-booghobeish et al. (20) in 2018 demonstrated that the incidence and severity of PONV were significantly lower in the ginger group than in the placebo group. These studies are similar to our study. Also, Nanthakomon and Pongroj paw similar to our study showed that the most statistically significant differences occurred at 2 hours after recovery (21).

According to the results of the study, the frequency of vomiting after eye surgery was significantly lower in the ginger group than in the placebo group ($P < 0.001$). A study by Bameski et al. indicated that the ginger extract may play a role in reducing the frequency of vomiting (27) and another study by Hajbaghery et al. showed that ginger could reduce the frequency of vomiting in post-nephrectomy surgery, which coincide with the current study (28). Vousooghian et al. demonstrated that ginger could decrease vomiting but was ineffective in the onset of PONV (29). However, another study by Morin indicated that the ginger extract did not affect PONV in the first 24 hours post-surgery (30). It is very important to know that the ginger dose in Vosoghian et al. study was 500 mg

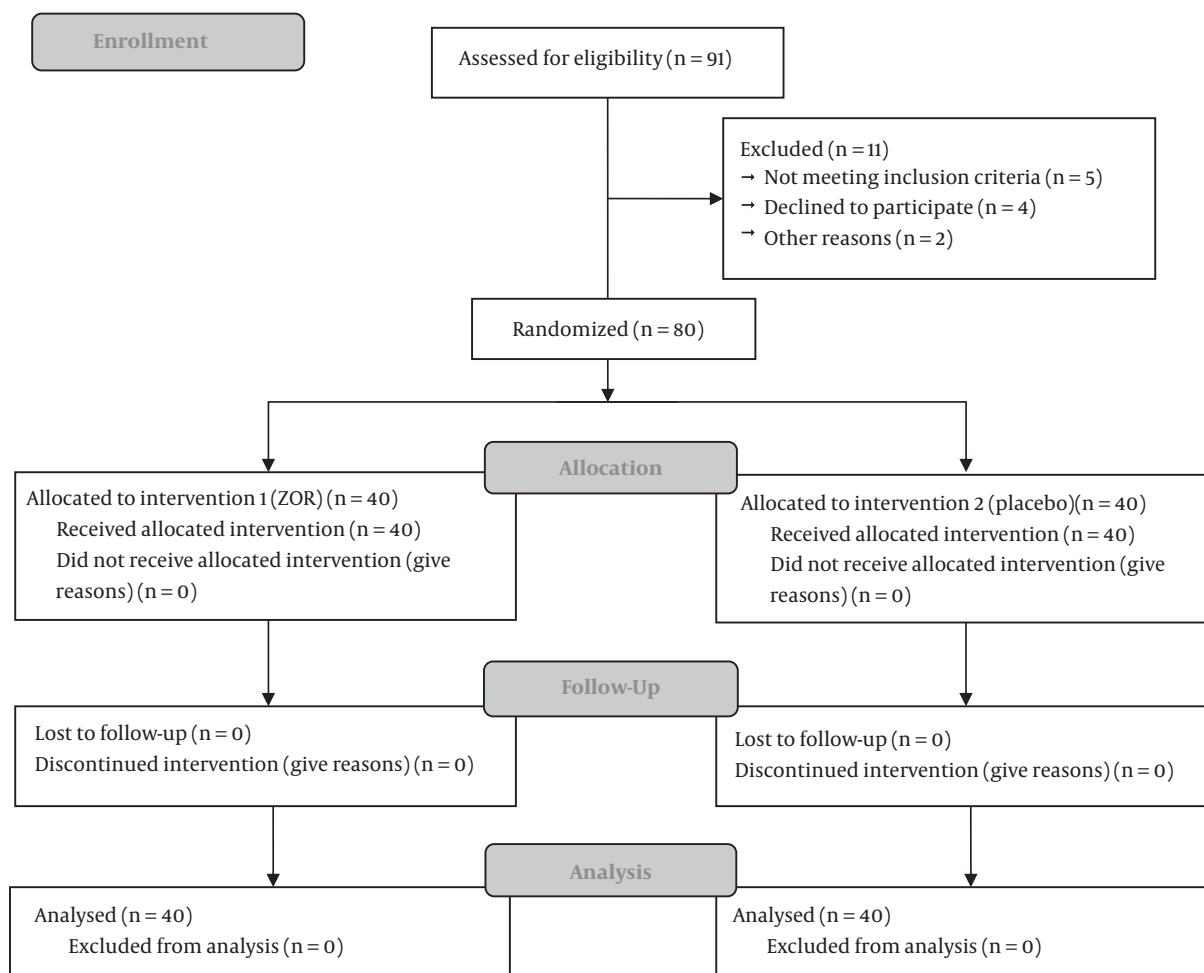


Figure 1. The consort 2010 flow diagram

Table 1. The Frequency and Severity of Nausea in Two Groups^a

Nausea	After Recovery	After 15 Minutes	After 30 Minutes	After 2 Hours
Ginger group (n = 40)	1.05 ± 2.04, 2 (5)	1.28 ± 2.47, 1 (2.5)	0.50 ± 1.40, 0 (0)	1.37 ± 2.24, 1 (2.5)
Placebo group (n = 40)	2.03 ± 2.89, 4 (10)	2.07 ± 2.78, 4 (10)	0.53 ± 1.33, 2 (5)	2.43 ± 2.72, 0 (0)
P value	0.03	0.1	0.8	0.02

^aValues are expressed as mean ± SD, No. (%).

(29) and in Bameshki et al study, the frequency of vomiting was almost equal in both ginger and placebo groups with no significant difference (27). The ginger dose in the present study was 1000 mg while a meta-analysis study performed by Chaiyayaknaprak et al. in 2006 demonstrated that a minimum dose of 1 g prevented the PONV (23).

Nonetheless, based on the guideline provided for PONV management after surgery in 2013 and the previ-

ous meta-analysis, the ginger treatment did not show to be effective in preventing PONV but a recent meta-analysis proved that the administration of a minimum dose of 1 g an hour prior to anesthesia was more effective than placebo (15-18). Therefore, our study used capsules containing 1 g ginger and showed the effectiveness of ginger in reducing PONV.

According to the literature, there has been no study

Table 2. The Frequency of Vomiting in Two Groups^a

Vomiting	After Recovery	After 15 Minutes	After 30 Minutes	After 2 Hours	Total
Ginger group (n = 40)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Placebo group (n = 40)	4 (10)	2 (5)	2 (5)	0 (0)	10 (40)
P value	< 0.001	> 0.05	< 0.001	1	< 0.001

^aValues are expressed as No. (%).

Table 3. Effect of Ginger and Placebo on Vital Signs Before and After Anesthesia^a

Variable	Ginger Group (N = 40)	Placebo Group (N = 40)	P Value
Systolic blood pressure (mmHg)			
Before	128.84 ± 11.94	127.36 ± 13.15	0.61
After	124.21 ± 13.25	127.71 ± 12.50	0.24
Diastolic blood pressure (mmHg)			
Before	76.71 ± 7.20	76.39 ± 8.30	0.86
After	74.81 ± 8.27	77.95 ± 7.62	0.09
Heart rate			
Before	80.74 ± 11.69	80.24 ± 9.31	0.84
After	78.08 ± 9.47	80.79 ± 9.34	0.21
Respiratory rate			
Before	20.24 ± 2.29	18.74 ± 1.85	0.25
After	19.61 ± 2.47	19.67 ± 2.47	0.06

^aValues are expressed as mean ± SD.

of changes in the vital signs of patients before and after ginger administration. This may be a strong point for the present study. The results showed that ginger had no adverse effects on the vital signs of patients undergoing eye surgery.

4.1. Conclusions

Based on the results obtained in this study, it is concluded that ginger can be used as a prophylactic herbal medicine to prevent PONV after eye surgery. Also, considering the absence of adverse changes in vital signs, its low cost, and easy access, ginger can be suggested as a proper PONV prevention candidate for patients with eye surgery by considering other health conditions.

Acknowledgments

This study was funded by the Iran University of Medical Sciences (research code: 2014060918020N1-IRCT). We would like to express our appreciation to the staff in the anesthesia ward of the hospital.

Footnotes

Authors' Contribution: Study design and implementation: Shahnam Sedigh Maroufi, Seyed Ali Akbar Moosavi, and Mehmet Oguz; corresponding author: Parisa Moradi Majd; study design: Farnad Imani; making capsules and drugs Hamidreza Samaee.

Clinical Trial Registration Code: IRCT code: 2014060918020N1 from www.irct.ir.

Conflict of Interests: There is no conflict of interest to be declared.

Ethical Approval: Samples and medical consent were taken based on ethical code 101568 from the Iran University of Medical Sciences (IUMS).

Funding/Support: This study was funded by the Iran University of Medical Sciences (Research code: 2014060918020N1-IRCT).

Patient Consent: Informed consent of patients was obtained.

References

1. Imani F, Zafarghandi-Motlagh M. Postoperative nausea and vomiting in patients undergoing laparoscopy. *J Minim Invasive Surg Sci.*

- 2013;**2**(2):138–43.
2. Apfel CC, Philip BK, Cakmakaya OS, Shilling A, Shi YY, Leslie JB, et al. Who is at risk for postdischarge nausea and vomiting after ambulatory surgery? *Anesthesiology*. 2012;**117**(3):475–86. doi: [10.1097/ALN.0b013e318267ef31](https://doi.org/10.1097/ALN.0b013e318267ef31). [PubMed: [22846680](https://pubmed.ncbi.nlm.nih.gov/22846680/)].
 3. Pierre S, Whelan R. Nausea and vomiting after surgery. *Cont Educ Anaesth Crit Care Pain*. 2013;**13**(1):28–32. doi: [10.1093/bjaceaccp/mks046](https://doi.org/10.1093/bjaceaccp/mks046).
 4. Carlisle JB, Stevenson CA. Drugs for preventing postoperative nausea and vomiting. *Cochrane Database Syst Rev*. 2006;(3). CD004125. doi: [10.1002/14651858.CD004125.pub2](https://doi.org/10.1002/14651858.CD004125.pub2). [PubMed: [16856030](https://pubmed.ncbi.nlm.nih.gov/16856030/)]. [PubMed Central: [PMC6463839](https://pubmed.ncbi.nlm.nih.gov/PMC6463839/)].
 5. Habib AS, Gan TJ. Evidence-based management of postoperative nausea and vomiting: A review. *Can J Anaesth*. 2004;**51**(4):326–41. doi: [10.1007/BF03018236](https://doi.org/10.1007/BF03018236). [PubMed: [15064261](https://pubmed.ncbi.nlm.nih.gov/15064261/)].
 6. Ernst E, Pittler MH. Efficacy of ginger for nausea and vomiting: A systematic review of randomized clinical trials. *Br J Anaesth*. 2000;**84**(3):367–71. doi: [10.1093/oxfordjournals.bja.a013442](https://doi.org/10.1093/oxfordjournals.bja.a013442). [PubMed: [10793599](https://pubmed.ncbi.nlm.nih.gov/10793599/)].
 7. Gupta R, Soto R. Prophylaxis and management of postoperative nausea and vomiting in enhanced recovery protocols: Expert opinion statement from the American Society for Enhanced Recovery (ASER). *Perioper Med (Lond)*. 2016;**5**:4. doi: [10.1186/s13741-016-0029-0](https://doi.org/10.1186/s13741-016-0029-0). [PubMed: [26941951](https://pubmed.ncbi.nlm.nih.gov/26941951/)]. [PubMed Central: [PMC4776417](https://pubmed.ncbi.nlm.nih.gov/PMC4776417/)].
 8. Gan TJ, Meyer T, Apfel CC, Chung F, Davis PJ, Eubanks S, et al. Consensus guidelines for managing postoperative nausea and vomiting. *Anesth Analg*. 2003;**97**(1):62–71. table of contents. doi: [10.1213/01.ane.0000068580.00245.95](https://doi.org/10.1213/01.ane.0000068580.00245.95). [PubMed: [12818945](https://pubmed.ncbi.nlm.nih.gov/12818945/)].
 9. Apfel CC, Roewer N. Risk assessment of postoperative nausea and vomiting. *Int Anesthesiol Clin*. 2003;**41**(4):13–32. doi: [10.1097/00004311-200341040-00004](https://doi.org/10.1097/00004311-200341040-00004). [PubMed: [14574212](https://pubmed.ncbi.nlm.nih.gov/14574212/)].
 10. Nesioonpour SH, Pipelzadeh MH, Mohtadi AR, Rezai S, Feghhi M, Malekshoar M. [A comparative study of dexamethasone, granisetron and metoclopramide for prevention of nausea and vomiting after cataract surgery]. *Bina J Ophthalmol*. 2009;**14**(4):413–9. Persian.
 11. Fleisher LA, Johns R, Savarese JJ, Wiener-Kronish J, Young W, Millers O. Abtahi A, Kamali F, Mahdavi NS, translators. [Miller's anesthesia]. Tehran: Andishe Rafi; 2011. Persian.
 12. McCracken G, Houston P, Lefebvre G; Society of Obstetricians; Gynecologists of Canada. Guideline for the management of postoperative nausea and vomiting. *J Obstet Gynaecol Can*. 2008;**30**(7):600–7. 608–16. [PubMed: [18644183](https://pubmed.ncbi.nlm.nih.gov/18644183/)].
 13. Cady RK, Goldstein J, Nett R, Mitchell R, Beach ME, Browning R. A double-blind placebo-controlled pilot study of sublingual feverfew and ginger (LipiGesic M) in the treatment of migraine. *Headache*. 2011;**51**(7):1078–86. doi: [10.1111/j.1526-4610.2011.01910.x](https://doi.org/10.1111/j.1526-4610.2011.01910.x). [PubMed: [21631494](https://pubmed.ncbi.nlm.nih.gov/21631494/)].
 14. Marx WM, Teleni L, McCarthy AL, Vitetta L, McKavanagh D, Thomson D, et al. Ginger (*Zingiber officinale*) and chemotherapy-induced nausea and vomiting: A systematic literature review. *Nutr Rev*. 2013;**71**(4):245–54. doi: [10.1111/nure.12016](https://doi.org/10.1111/nure.12016). [PubMed: [23550785](https://pubmed.ncbi.nlm.nih.gov/23550785/)].
 15. Hemmatzadeh S, Sadegi S, Sayyhmelli M, Pezeshky Z, Asnaashari S, Delazer A. [The comparison of ginger and metoclopramide in treatment of pregnant women's nausea and vomiting]. *Pharmaceut Sci*. 2007;**12**(4):1–5. Persian.
 16. Mandal P, Das A, Majumdar S, Bhattacharyya T, Mitra T, Kundu R. The efficacy of ginger added to ondansetron for preventing postoperative nausea and vomiting in ambulatory surgery. *Pharmacognosy Res*. 2014;**6**(1):52–7. doi: [10.4103/0974-8490.122918](https://doi.org/10.4103/0974-8490.122918). [PubMed: [24497743](https://pubmed.ncbi.nlm.nih.gov/24497743/)]. [PubMed Central: [PMC3897009](https://pubmed.ncbi.nlm.nih.gov/PMC3897009/)].
 17. Dabaghzadeh F, Khalili H, Dashti-Khavidaki S, Abbasian L, Moeinifard A. Ginger for prevention of antiretroviral-induced nausea and vomiting: A randomized clinical trial. *Expert Opin Drug Saf*. 2014;**13**(7):859–66. doi: [10.1517/14740338.2014.914170](https://doi.org/10.1517/14740338.2014.914170). [PubMed: [24820858](https://pubmed.ncbi.nlm.nih.gov/24820858/)].
 18. Seidi J, Ebnerasooli S, Shahsawari S, Nzarian S. The influence of oral ginger before operation on nausea and vomiting after cataract surgery under general anesthesia: A double-blind placebo-controlled randomized clinical trial. *Electron Physician*. 2017;**9**(1):3508–14. doi: [10.19082/3508](https://doi.org/10.19082/3508). [PubMed: [28243400](https://pubmed.ncbi.nlm.nih.gov/28243400/)]. [PubMed Central: [PMC5308488](https://pubmed.ncbi.nlm.nih.gov/PMC5308488/)].
 19. Eberhart LH, Geldner G, Kranke P, Morin AM, Schaufelien A, Treiber H, et al. The development and validation of a risk score to predict the probability of postoperative vomiting in pediatric patients. *Anesth Analg*. 2004;**99**(6):1630–7. table of contents. doi: [10.1213/01.ANE.0000135639.57715.6C](https://doi.org/10.1213/01.ANE.0000135639.57715.6C). [PubMed: [15562045](https://pubmed.ncbi.nlm.nih.gov/15562045/)].
 20. Albooghobeish M, Ghomeishi A, Adarvishi S, Neisi A, Mahmoodi K, Asadi M, et al. The effect of preoperative zintoma capsule on postoperative nausea and vomiting after laparoscopic cholecystectomy. *Anesth Pain Med*. 2018;**8**(5). e67132. doi: [10.5812/aapm.67132](https://doi.org/10.5812/aapm.67132). [PubMed: [30533389](https://pubmed.ncbi.nlm.nih.gov/30533389/)]. [PubMed Central: [PMC6241159](https://pubmed.ncbi.nlm.nih.gov/PMC6241159/)].
 21. Nanthakomom T, Pongrojpa D. The efficacy of ginger in prevention of postoperative nausea and vomiting after major gynecologic surgery. *J Med Assoc Thai*. 2006;**89**(Suppl 4):S130–6.
 22. Betz O, Kranke P, Geldner G, Wulf H, Eberhart LH. [Is ginger a clinically relevant antiemetic? A systematic review of randomized controlled trials]. *Forsch Komplementarmed Klass Naturheilkd*. 2005;**12**(1):14–23. German. doi: [10.1159/000082536](https://doi.org/10.1159/000082536). [PubMed: [15772458](https://pubmed.ncbi.nlm.nih.gov/15772458/)].
 23. Chaiyakunapruk N, Kitikannakorn N, Nathisuwan S, Leeprakobboon K, Leelasattagool C. The efficacy of ginger for the prevention of postoperative nausea and vomiting: A meta-analysis. *Am J Obstet Gynecol*. 2006;**194**(1):95–9. doi: [10.1016/j.ajog.2005.06.046](https://doi.org/10.1016/j.ajog.2005.06.046). [PubMed: [16389016](https://pubmed.ncbi.nlm.nih.gov/16389016/)].
 24. Gan TJ, Diemunsch P, Habib AS, Kovac A, Kranke P, Meyer TA, et al. Consensus guidelines for the management of postoperative nausea and vomiting. *Anesth Analg*. 2014;**118**(1):85–113. doi: [10.1213/ANE.0000000000000002](https://doi.org/10.1213/ANE.0000000000000002). [PubMed: [24356162](https://pubmed.ncbi.nlm.nih.gov/24356162/)].
 25. Rusch D, Eberhart LH, Wallenborn J, Kranke P. Nausea and vomiting after surgery under general anesthesia: An evidence-based review concerning risk assessment, prevention, and treatment. *Dtsch Arztebl Int*. 2010;**107**(42):733–41. doi: [10.3238/arztebl.2010.0733](https://doi.org/10.3238/arztebl.2010.0733). [PubMed: [21079721](https://pubmed.ncbi.nlm.nih.gov/21079721/)]. [PubMed Central: [PMC2977990](https://pubmed.ncbi.nlm.nih.gov/PMC2977990/)].
 26. Mandelcorn M, Taback N, Mandelcorn E, Ananthanarayan C. Risk factors for pain and nausea following retinal and vitreous surgery under conscious sedation. *Can J Ophthalmol*. 1999;**34**(5):281–5. [PubMed: [10486687](https://pubmed.ncbi.nlm.nih.gov/10486687/)].
 27. Bameshki A, Namaiee MH, Jangjoo A, Dadgarmoghaddam M, Ghalibaf MHE, Ghorbanzadeh A, et al. Effect of oral ginger on prevention of nausea and vomiting after laparoscopic cholecystectomy: A double-blind, randomized, placebo-controlled trial. *Electron Physician*. 2018;**10**(2):6354–62. doi: [10.19082/6354](https://doi.org/10.19082/6354). [PubMed: [29629059](https://pubmed.ncbi.nlm.nih.gov/29629059/)]. [PubMed Central: [PMC5878030](https://pubmed.ncbi.nlm.nih.gov/PMC5878030/)].
 28. Adib-Hajbaghery M, Hosseini FS. Investigating the effects of inhaling ginger essence on post-nephrectomy nausea and vomiting. *Complement Ther Med*. 2015;**23**(6):827–31. doi: [10.1016/j.ctim.2015.10.002](https://doi.org/10.1016/j.ctim.2015.10.002). [PubMed: [26645524](https://pubmed.ncbi.nlm.nih.gov/26645524/)].
 29. Vousooghian M, Amini H. [The effect of ginger on post-operative nausea and vomiting in non-fertile women affect gynecological surgery]. *J Iran Soc Anaesthesiol Intensive Care*. 2012;**34**(79):58–64. Persian.
 30. Morin AM, Betz O, Kranke P, Geldner G, Wulf H, Eberhart LH. [Is ginger a relevant antiemetic for postoperative nausea and vomiting?]. *Anesthesiol Intensivmed Notfallmed Schmerzther*. 2004;**39**(5):281–5. German. doi: [10.1055/s-2004-814438](https://doi.org/10.1055/s-2004-814438). [PubMed: [15156419](https://pubmed.ncbi.nlm.nih.gov/15156419/)].