

The Efficacy of Ginger in Prevention of Postoperative Nausea and Vomiting after Major Gynecologic Surgery

Tongta Nanthakomon MD*,
Densak Pongrojapaw MD*

* Department of Obstetrics and Gynecology, Faculty of Medicine, Thammasat University

Objective: To study the efficacy of ginger in prevention of nausea and vomiting after major gynecologic surgery.

Study design: Double blind randomized controlled trial.

Setting: Department of Obstetrics and Gynecology, Thammasat University Hospital, Faculty of Medicine, Thammasat University, Pathumthani, 12120, Thailand.

Material and Method: From March 2005 to April 2006, 120 patients who underwent major gynecologic surgery were randomized into group A (n = 60) and group B (n = 60). The patients in group A received two capsules of ginger taken one hour before the procedure (one capsule contains 0.5 gram of ginger powder). The patients in group B received the placebo. The visual analog nausea score (VANS) and frequency of vomiting were evaluated at 0, 2, 6, 12, and 24 hours after the operation.

Results: The results demonstrated the statistically significant differences in nausea between group A (48.3%) and group B (66.7%). The VANS was lower in group A compared to group B at 2, 6, 12, and 24 hours. The most statistically significant differences occurred at 2 and 6 hour. The incidence and frequency of vomiting in group A were lower than group B. Side effects caused by ginger were not detected.

Conclusion: Ginger has efficacy in prevention of nausea and vomiting after major gynecologic surgery.

Keywords: Major gynecologic surgery, Ginger, Nausea, Vomiting

J Med Assoc Thai 2006; 89 (Suppl 4): S130-6

Full text. e-Journal: <http://www.medassocthai.org/journal>

Postoperative nausea and vomiting (PONV) is still a common complication and occasionally a severe complication of anesthesia that occurs frequently at the time of recovery from surgery. Before the 1960s, when older inhalational anesthetic agents such as ether and cyclopropane were used, the incidence of PONV was as high as 60%⁽¹⁾. Recently, new generations of antiemetics and shorter-acting anesthetic drugs have been used and incidences of PONV have been reduced to approximately 30%⁽²⁾.

Several risk factors for nausea and vomiting after surgery are patient's age, body weight, previous postoperative nausea and vomiting, surgical procedures, anesthetic methods and preoperative eating patterns⁽¹⁻⁵⁾. The PONV significantly causes anxiety,

Correspondence to : Nanthakomon T, Department of Obstetrics and Gynecology, Faculty of Medicine, Thammasat University, Bangkok 12120, Thailand.

slows recovery via weakened body defenses and increase postoperative pain. The effects of nausea and vomiting range from simply annoying to life threatening electrolyte disturbances⁽⁶⁾. The efforts of vomiting can cause wound dehiscence and even aspiration of gastric content in certain situations⁽¹⁾.

Nausea and vomiting are complex responses. They can occur independently but both involve a central nervous system pathway from the area postrema and chemoreceptor trigger zone in medulla oblongata. Once activated, the gastrointestinal response often follows, which includes hypotonicity, hypoperistalsis, hyposecretion, decreased small intestinal motility and ejection of stomach and small intestine contents. The neurotransmitters thought to be involved are cholinergic and serotonin agonists⁽⁷⁾.

Ginger (*Zingiber officinale*) is used as a broad spectrum anti-emetic. The pharmacological activity is

thought to lie in pungent principles (gingerols and shogaols) and volatile oils (sesquiterpenes and monoterpenes)⁽⁸⁾. Ginger acts within the gastrointestinal tract by increasing tone and peristalsis due to anticholinergic and antiserotonin action. Ginger avoids the central nervous system side effects caused by most antiemetic drugs⁽⁸⁾. Ginger is on the FDA's GRAS (generally recognized as safe) lists. Like onions and garlic, extracts of ginger inhibit blood coagulation in vitro⁽⁹⁻¹¹⁾. Ginger has few recorded side effects. In large doses, ginger may increase gastric exfoliation and antiprostaglandin activity in vitro. However, the clinical significance of these observations is yet to be determined⁽¹²⁾.

Ginger is helpful in prevention and treatment of various forms of nausea and vomiting. Many studies showed that ginger significantly reduced nausea and vomiting in morning sickness^(14,15). However, a study by Stott JRR and colleagues⁽¹⁶⁾ found that ginger was not any more effective than placebo in motion sickness.

Bone M and colleagues⁽⁶⁾ compared the effects of ginger, placebo, and metoclopramide in the treatment of nausea following gynecologic surgery. The results indicated that both treatments produced similar benefits as compared to placebo. Some similar double-blinded studies of nausea and vomiting after outpatient gynecologic laparoscopy showed that ginger was effective in the prevention of post-operative nausea and vomiting^(6,18,19). However, some studies demonstrated no significant difference between ginger and a placebo^(5,20,21).

Since the first study in 1990⁽⁶⁾, there have been six randomized-placebo controlled trials investigating the efficacy of ginger in preventing postoperative nausea and vomiting, but only one trial involved major gynecologic surgery^(5,6,18-21). In 1990, Bone M and colleagues⁽⁶⁾ studied the effect of ginger root on post-operative nausea and vomiting in major gynecologic surgery. There were only 39 of 60 patients who underwent major laparotomy in the study⁽⁶⁾. The result of the efficacy of ginger on postoperative nausea and vomiting following major gynecologic surgery was inconclusive. This study was designed as a double blind randomized controlled trial. The question on whether the efficacy of ginger in prevention of postoperative nausea and vomiting after major gynecologic surgery is factual.

Material and Method

The present study was a prospective, double blind, randomized controlled trial. The investigation

was approved by the medical ethics committee of the Faculty of Medicine, Thammasat University and information on this study was sent to all gynecologic consultants and anesthetic consultants.

The trial was conducted from March 2005 to April 2006. A total number of 120 patients, aged between 20 to 60 years who were scheduled for elective major gynecologic surgery (exploratory laparotomy) participated in the trial. All patients were ASA (American Society of Anesthesia) grade 1 or 2. All were informed about the purpose of this clinical trial. Written consent was obtained from each participant. Any patients that were pregnant, suffered from hepatitis or gastrointestinal disease, ingested alcohol, opioids or antiemetics within 24 hours prior to the surgery, were excluded from the trial.

The patients were divided into two groups by random allocation. Group A received two capsules of ginger (each capsule contained 0.5 gram of powdered ginger). The ginger capsules were prepared by Khao-la-o laboratorie Ltd, part, Thailand. The patients in group B received two capsules of placebo (each capsule contains 0.5 gram of lactose). The placebo capsules were prepared by pharmacy unit of Thammasat University Hospital. Both capsules were identical in size, color, and odor. All capsules were then prepackaged prior to being coded. Participants swallowed two capsules with 20 ml of water one hour prior surgery. No participants were premedicated in order to avoid ambiguities.

A similar anesthetic technique was employed throughout the trial. Induction of anesthesia was with thiopental, followed by alcuronium or vecuronium and tracheal intubation. Medication that can cause nausea and vomiting such as morphine, was not used in the study. At the end of procedure, neuromuscular blockade was reversed with neostigmine and atropine. The patients were assessed at 0, 2, 6, 12 and 24 hours after the completion of each procedure. Each patient was then assessed by one of our investigators as soon as she recovered from anesthesia. Nausea and vomiting were treated with metoclopramide 10 mg intravenously upon the request from the patient at no more than 6 hourly intervals. Diclofenac 75 mg was prescribed on request for postoperative pain at no more than 6 hourly intervals. All prescriptions were recorded during the trial.

Nausea was recorded on a 10 cm linear analogue scale which ranged from 0 to 10, 0 being for no symptoms of nausea and 10 being for most nausea. The number of vomiting episodes and other side effects, for example itching, abdominal pain etc were recorded.

Data were analyzed using Chi-square test, t-test, Fisher's Exact test and ANOVA test. p-values < 0.05 were considered statistically significant.

Results

The demographic data were similar in both groups (Table 1). The type, duration of preoperative fasting and duration of surgery were also comparable. There were no statistically significant differences between the two groups (Table 2).

Twenty-nine patients (48.3%) in group A reported nausea compared to 40 patients (66.7%) in group B ($p < 0.05$) (Table 3). The number of patients with vomiting in group A (17/60; 28.3%) was significantly fewer than that in group B (28/60; 46.7%, $p = 0.038$). Furthermore, the need for post-operative antiemetics was less in the ginger group (18.3%) compared to the placebo group (33%). Nonetheless, the result does not reach statistical significance. Thirty-four patients (56.70%) in group A and forty patients (66.70%) in group B requested analgesia ($p > 0.05$) (Table 3).

Visual analogue scores of nausea (VANS) at 2, 6, 12 and 24 hours after the operation were lower in group A compared to group B. This result demonstrates statistically significant differences at 2 and 6 hours after the operation ($p < 0.05$) (Table 4). After adjusting VANS for duration of operation, VANS at 2, 6, 12 and 24 hours were still lower in group A compared to group B ($p < 0.05$). There were no statistically significant differences in VANS at 12 and 24 hours for both groups (Table 5).

Discussion

Post-operative nausea and vomiting have long been regarded as the most unpleasant sequel of anesthesia. The use of antiemetics prophylactically has been argued but the high incidence of side effects of all standard antiemetic drugs give rise to justified caution. Ginger, known scientifically as *Zingiber Officinale*⁽¹¹⁾, is a perennial native to many Asian countries. The aromatic and carminative properties of ginger may increase gastric motility and absorbent properties, which help in neutralizing toxins and acid, block effec-

Table 1. Demographic data of the patients in both groups

Parameter	Treatment				p-value* (2-tailed)
	Ginger (n = 60)		Placebo (n = 60)		
	n	(%)	n	(%)	
Age (years)					1.000
20-40	27	45.0	26	43.3	
41-60	33	55.0	34	56.7	
Weight (kg)					0.053
Mean \pm SD	58.43 \pm 9.35		54.58 \pm 12.23		
BMI (kg/m ²)					0.090
Mean \pm SD	24.09 \pm 3.79		22.80 \pm 4.46		
Occupation					0.491
Employee	28	46.7	28	46.7	
Government	4	6.7	10	16.7	
Tradesman	6	10.0	4	6.7	
Housewife	20	33.3	16	26.7	
Others	2	3.3	2	3.3	
Education					0.142
No education	4	6.7	0	0.0	
Primary	21	35.0	28	46.7	
Junior highschool	8	13.3	4	6.7	
Highschool	18	30.0	16	26.7	
Bachelor degree	9	15.0	12	20.0	

*, Chi-square test for comparison of age, occupation and education

T-test for weight and BMI

BMI, Body Mass Index

Table 2. Type of operation and duration of operation

Parameter	Treatment				p-value* (2-tailed)
	Ginger (n = 60)		Placebo (n = 60)		
	n	(%)	n	(%)	
Type of operation					0.234**
Wertheim's operation	2	3.3	4	6.7	
TAH ± BSO	36	60.0	42	70.0	
SO, cystectomy	22	36.7	14	23.3	
Duration of NPO (mins)					
Wertheim's operation	547.50 ± 10.61		554.50 ± 0.58		0.204*
TAH ± BSO	642.64 ± 111.27		686.43 ± 123.66		0.104*
SO, cystectomy	662.73 ± 80.10		701.07 ± 68.45		0.148*
Average	646.83 ± 100.35		681.05 ± 113.40		0.083*
Duration of operation (mins)					
Wertheim's operation	330.00 ± 63.64		315.00 ± 17.32		0.648*
TAH ± BSO	135.83 ± 39.42		125.71 ± 40.31		0.268*
SO, cystectomy	118.18 ± 78.89		147.86 ± 77.20		0.249*
Average	127.08 ± 61.11		128.17 ± 66.58		0.937*

** , Chi-square test for comparison of type of operation

* , t-test for comparison duration of NPO and duration of operation

NPO, Nothing per oral

TAH, Total abdominal hysterectomy

BSO, Bilateral salpingoophorectomy

SO, salpingoophorectomy

Table 3. Post operative nausea, vomiting and the use of antiemetic and analgesia

Parameter	Treatment				p-value* (2-tailed)
	Ginger (n = 60)		Placebo (n = 60)		
	n	(%)	n	(%)	
Nausea					0.042
Yes	29	48.3	40	66.7	
No	31	51.7	20	33.3	
Vomiting					0.038
Yes	17	28.3	28	46.7	
No	43	71.7	32	53.3	
Antiemetic					0.095
Yes	11	18.3	20	33.3	
No	49	81.7	40	66.7	
Analgesia					0.348
Yes	34	56.7	40	66.7	
No	26	43.3	20	33.3	
Frequency of vomiting (number of time)					0.173
0	43	70.0	32	50.0	
1	9	15.0	14	23.3	
2	6	10.0	8	13.3	
3	2	5.0	6	13.3	

* Chi-square test

Table 4. Visual Analogue Nausea Score (VANS) of both groups at 0, 2, 6, 12, and 24 hours

Parameter	Treatment		p-value* (2-tailed)
	Ginger (n = 60)	Placebo (n = 60)	
	Mean \pm SD	Mean \pm SD	
VANS at T 0	0.00 \pm 0.00	0.00 \pm 0.00	
VANS at T 2	1.05 \pm 2.03	2.03 \pm 2.88	0.033
VANS at T 6	1.37 \pm 2.23	2.43 \pm 2.71	0.020
VANS at T 12	1.28 \pm 2.46	2.07 \pm 2.79	0.105
VANS at T 24	0.50 \pm 1.41	0.53 \pm 1.35	0.895

*, t test

Table 5. Statistical test for the means of VANS between ginger and placebo cross the time after adjusting for duration of operation

Time (hour)	Ginger	Placebo	Difference Mean \pm SE	95% Confidence Interval for Mean		p-value*
	Mean	Mean		Lower Bound	Upper Bound	
0	0.00	0.00	0.00 \pm 0.00	0.000	0.000	
2	1.05	2.03	0.98 \pm 0.23	1.084	1.999	0.033
6	1.37	2.43	1.06 \pm 0.23	1.442	2.358	0.020
12	1.28	2.07	0.79 \pm 0.24	1.196	2.154	0.105
24	0.50	0.53	0.03 \pm 0.12	0.269	0.765	0.895

*, using ANOVA for repeated measurements adjusted for duration of operation

tive in blocking gastrointestinal reaction and subsequent nausea feedback.

Recent meta-analysis study⁽²²⁾ pooled data from six randomized trials^(5,6,18-21) to assess the efficacy of ginger in preventing postoperative nausea and vomiting in gynecologic surgery relative to placebo revealed that, patients who were premedicated with ginger yielded significantly better results than those who took placebos. The relative risk of PONV and POV (postoperative vomiting) were 0.65 and 0.62, respectively⁽²²⁾. Nevertheless, in the meta-analysis study, there were only 39 out of 363 patients who underwent a laparotomy procedure⁽²²⁾. The authors were interested to study whether ginger could reduce nausea and vomiting after a major gynecologic operation.

Several factors are known to summate postoperative nausea and vomiting. These include age, weight, type of operation and operative duration. All these factors were taken into account for each individual trial group, and were equally distributed in both groups.

The incidence of nausea and vomiting in our study was higher than other published studies. We believed that, the prolonged operative duration and type of operation influenced the results. On average, the operative duration in the present study was longer than in previous studies^(5,18-21). Our average time spent was 127 minutes compared to other non-major gynecologic surgery studies that were 25 to 70 minutes^(5,18-21).

In addition to other studies, we have compared the mean values of the VANS in order to control the influence of the operating duration on our trial^(5,6,18-21). After considering all influential factors, the VANS still showed a statistically significant difference in both groups at 2 and 6 hours after the operation. The VANS at 12 and 24 hours after the operation was not statistically significant. For all the patients from this study, no toxicity caused by ginger was found, as with previous reports^(5,6,18,20,21).

Using ginger as an antiemetic, to prevent nausea and vomiting in operations is limited on pharmaceutical grounds. There are no parenteral prepara-

tions available^(5,6,18-21). The dosage usually requires at least 1 gram, one hour before the operation. A dosage of more than 6 grams of ginger may cause gastric irritation⁽²³⁾.

We recommend further studies on the use of ginger as an antiemetic for prevention of postoperative nausea and vomiting in other operation, when performed under general anesthesia, such as postpartum tubal ligation, curettage, and hysteroscopy.

References

1. Gan TJ. Postoperative nausea and vomiting - can it be eliminated? *JAMA* 2002; 287: 1233-6.
2. Papadimitriou L, Pourgezi T, Petropoulos G, Vassiliou J, Papadimitriou J. Tropisetron or ondansetron for the prevention of post-operative nausea and vomiting (PONV). *Eur J Anaesthesiol* 1999; 16: 736.
3. Haynes GR, Bailey MK. Postoperative nausea and vomiting: review and clinical approaches. *South Med J* 1996; 89: 940-9.
4. Tramer MR. Treatment of postoperative nausea and vomiting. *BMJ* 2003; 327: 762-3.
5. Arfeen Z, Owen H, Plummer JL, Ilesley AH, Sorby-Adams RA, Doecke CJ. A double-blind randomized controlled trial of ginger for the prevention of postoperative nausea and vomiting. *Anaesth Intensive Care* 1995; 23: 449-52.
6. Bone ME, Wilkinson DJ, Young JR, McNeil J, Charlton S. Ginger root - a new antiemetic. The effect of ginger root on postoperative nausea and vomiting after major gynaecological surgery. *Anaesthesia* 1990; 45: 669-71.
7. Hasler WL. Nausea, vomiting and indigestion. In: Kasper DL, Braunwald E, Fauci AS, Hauser SL, Longo DL, Jamson JA, editors. *Harrison's principles of internal medicine*. 16th ed. New York: McGraw-Hill; 2005: 219-24.
8. Bryer E. A literature review of the effectiveness of ginger in alleviating mild-to-moderate nausea and vomiting of pregnancy. *J Midwifery Womens Health* 2005; 50: e1-e3.
9. Srivastava KC. Isolation and effects of some ginger components of platelet aggregation and eicosanoid biosynthesis. *Prostaglandins Leukot Med* 1986; 25: 187-98.
10. Srivas KC. Effects of aqueous extracts of onion, garlic and ginger on platelet aggregation and metabolism of arachidonic acid in the blood vascular system: in vitro study. *Prostaglandins Leukot Med* 1984; 13: 227-35.
11. Lumb AB. Mechanism of antiemetic effect of ginger. *Anaesthesia* 1993; 48: 1118.
12. Vutyavanich T, Kraissarin T, Ruangsri R. Ginger for nausea and vomiting in pregnancy: randomized, double-masked, placebo-controlled trial. *Obstet Gynecol* 2001; 97: 577-82.
13. Fischer-Rasmussen W, Kjaer SK, Dahl C, Asping U. Ginger treatment of hyperemesis gravidarum. *Eur J Obstet Gynecol Reprod Biol* 1991; 38: 19-24.
14. Keating A, Chez RA. Ginger syrup as an antiemetic in early pregnancy. *Altern Ther Health Med* 2002; 8: 89-91.
15. Grontved A, Brask T, Kambskard J, Hentzer E. Ginger root against seasickness. A controlled trial on the open sea. *Acta Otolaryngol* 1988; 105: 45-9.
16. Stott JR, Hubble MP, Spencer MB. A double blind comparative trial of powder ginger root, hyosine hydrobromide, and cinnarizine in the prophylaxis of motion sickness induced by cross coupled stimulation. *Advisory Group for Aerospace Research and Development, Conference Proceedings* 1985; 372: 1-6.
17. 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: 281-5.
18. Phillips S, Ruggier R, Hutchinson SE. *Zingiber officinale* (ginger) - an antiemetic for day case surgery. *Anaesthesia* 1993; 48: 715-7.
19. Pongrojapaw D, Chiamchanya C. The efficacy of ginger in prevention of post-operative nausea and vomiting after outpatient gynecological laparoscopy. *J Med Assoc Thai* 2003; 86: 244-50.
20. Eberhart LH, Mayer R, Betz O, Tsolakidis S, Hilpert W, Morin AM, et al. Ginger does not prevent postoperative nausea and vomiting after laparoscopic surgery. *Anesth Analg* 2003; 96: 995-8.
21. Visalyaputra S, Petchpaisit N, Somcharoen K, Choavaratana R. The efficacy of ginger root in the prevention of postoperative nausea and vomiting after outpatient gynaecological laparoscopy. *Anaesthesia* 1998; 53: 506-10.
22. 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: 95-9.
23. Desai HG, Kalro RH, Choksi AP. Effect of ginger & garlic on DNA content of gastric aspirate. *Indian J Med Res* 1990; 92: 139-41.

ประสิทธิภาพของขิงในการป้องกันอาการคลื่นไส้ อาเจียนภายหลังการผ่าตัดเปิดช่องท้องทาง นรีเวช

ต้องตา นันทโกมล, เด่นศักดิ์ พงศ์โรจน์เฝ้า

วัตถุประสงค์: เพื่อศึกษาประสิทธิภาพของขิงในการป้องกันอาการคลื่นไส้ อาเจียนภายหลังการผ่าตัดเปิดช่องท้องทางนรีเวช

รูปแบบการวิจัย: Double blind randomized controlled trial

สถานที่: สาขาสูติศาสตร์-นรีเวชวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยธรรมศาสตร์

วัสดุและวิธีการ: ศึกษาตั้งแต่ มีนาคม พ.ศ. 2548 - เมษายน พ.ศ. 2549 ผู้ป่วยที่ต้องได้รับการผ่าตัดเปิดช่องท้องทางนรีเวช จำนวน 120 ราย อายุระหว่าง 20-60 ปี ได้ทำการแบ่งกลุ่มแบบสุ่ม เป็น 2 กลุ่มๆละ 60 ราย กลุ่ม A จะได้รับยาขิง 2 แคปซูล (1 แคปซูลประกอบด้วยขิง 0.5 กรัม) 1 ชั่วโมงก่อนการผ่าตัด และกลุ่ม B จะได้รับยาหลอก ประเมิน Visual analogue score (VANS) จำนวนครั้งที่อาเจียน และผลข้างเคียง ที่เวลา 2, 6, 12 และ 24 ชั่วโมงหลังผ่าตัด

ผลการศึกษา: จำนวนผู้ป่วยที่มีอาการคลื่นไส้ภายหลังการผ่าตัดในกลุ่มที่ได้รับยาขิง น้อยกว่าในกลุ่มที่ได้รับยาหลอก อย่างมีนัยสำคัญทางสถิติ 29 ราย (48.3%) เทียบกับ 40 ราย (66.7%) ผู้ป่วยกลุ่มที่ได้รับยาขิง มีค่า VANS ที่ 2 และ 6 ชั่วโมง ต่ำกว่าในกลุ่มที่ได้รับยาหลอก อย่างมีนัยสำคัญทางสถิติ แต่ที่เวลา 12 และ 24 ชั่วโมง ไม่แตกต่างอย่างมีนัยสำคัญทางสถิติ จำนวนผู้ป่วยและจำนวนครั้งที่อาเจียนในกลุ่มที่ได้รับยาขิง มีน้อยกว่ากลุ่มที่ได้รับยาหลอก อย่างมีนัยสำคัญทางสถิติ

สรุป: ขิงมีประสิทธิภาพในการป้องกันอาการคลื่นไส้ ภายหลังการผ่าตัดเปิดช่องท้องทางนรีเวช
