Thai Journal of Obstetrics and Gynaecology
May 2025, Vol. 33, No. 3, pp. 266-275.

GYNAECOLOGY

The Efficacy of Oral Ginger Powder in Prevention of Postoperative Ileus after Benign Gynecologic Hysterectomy: A Randomized Controlled Trial

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ABSTRACT

Objectives: To assess the efficacy of oral ginger powder for prevention of postoperative bowel ileus in benign gynecologic abdominal hysterectomy.

Materials and Methods: A randomized, double-blind, placebo-controlled trial was conducted. Benign gynecologic patients who underwent abdominal hysterectomy were allocated into two groups: the experimental group received oral ginger capsules, and the control group received placebo capsules. Postoperative bowel ileus was measured by using time to first flatus as a primary outcome.

Results: Fifty-six patients were randomized to the ginger group (n = 28) and the placebo group (n = 28). The ginger group had significantly less time to first flatus than the control group (29.5 ±10.0 vs 38.9 ±8.6 hours, mean difference (MD) 9.31 hours, 95% confidence interval (CI) 4.2-14.3, p < 0.001). The ginger group also had significantly less time to first defecation than the control group (45.8 ±9.1 vs 58.5 ±14.7 hours, MD 12.6 hours, 95%CI 4.5-20.8, p = 0.003). According to the Kaplan-Meier graph, the median time to first flatus (50%) of the ginger group was 26.5 hours (95%CI 21.1-32.5) and that of the control group was 39.33 hours (95%CI 31.7- 44.7) (p = 0.007). Median time to defecation (50%) of the ginger group was 44.7 hours (95%CI 42.0-47.6) and that of the control group was 59.7 hours (95%CI 51.7-64.7) (p = 0.012). No serious adverse effects were reported.

Conclusion: Oral ginger powder could reduce postoperative bowel ileus in benign gynecologic abdominal hysterectomy.

Keywords: ginger, benign gynecologic surgery, postoperative bowel ileus

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Received: 29 September 2024, **Revised:** 23 December 2024, **Accepted:** 25 December 2024

การศึกษาประสิทธิภาพของการรับประทานขิงชนิดผงเพื่อป้องกันอาการท้องอืดหลังการผ่าตัดเอามดลูกออกทางหน้าท้อง: การทดลองแบบสุ่มที่มีกลุ่มควบคุม

วิชชุดา ล้อศิริรัตน์, สุกัญญา ศรีนิล

บทคัดย่อ

วัตถุประสงค์: *เพื่อศึกษาประสิทธิภาพของการรับประทานขิงชนิดผงในการป้องกันอาการท้องอืดหลังการผ่าตัดเอามดลูกออกทางหน้าท้องในกลุ่มโรคทางนรีเวชที่ไม่ใช่มะเร็ง*

วัสดุและวิธีการ: *เป็นการทดลองแบบสุ่มที่มีกลุ่มควบคุม โดยแบ่งกลุ่มอาสาสมัครที่เป็นผู้ป่วยทางนรีเวชที่ไม่ใช่มะเร็งและต้องได้รับการรักษาด้วยการผ่าตัดเอามดลูกออกทางหน้าท้องเป็นสองกลุ่ม คือ กลุ่มที่รับประทานขิงชนิดผง และกลุ่มได้รับยาหลอกภายหลังการผ่าตัด เพื่อศึกษาประสิทธิภาพของการรับประทานขิงชนิดผงป้องกันอาการท้องอืดด้วยการเปรียบเทียบระยะเวลาการผายลมครั้งแรกหลังการผ่าตัด*

ผลการศึกษา: *จำนวนอาสาสมัครในการวิจัยนี้มีทั้งสิ้น 56 ราย แบ่งเป็นกลุ่มที่รับประทานขิงชนิดผงจำนวน 28 ราย และกลุ่มได้รับยาหลอกจำนวน 28 ราย พบว่าอาสาสมัครกลุ่มที่รับประทานขิงชนิดผง มีระยะห่างของเวลาระหว่างการผายลมครั้งแรกและหลังการผ่าตัดเสร็จน้อยกว่ากลุ่มได้รับยาหลอก (29.5 ± 10.0 vs 38.9 ± 8.6 ชั่วโมง, mean difference (MD) 9.3 ชั่วโมง, 95% confidence interval (CI) 4.2-14.3, p < 0.001) รวมถึงระยะห่างของเวลาระหว่างการถ่ายอุจจาระครั้งแรกและหลังการผ่าตัดเสร็จมีระยะเวลาน้อยกว่ากลุ่มได้รับยาหลอกอย่างมีนัยสำคัญทางสถิติเช่นกัน (45.8 ± 9.1 vs 58.5 ± 14.7 ชั่วโมง, MD 12.6 ชั่วโมง, 95% CI 4.5-20.8, p = 0.003) นอกจากนี้ไม่พบผลข้างเคียงที่สัมพันธ์กับการรับประทานขิงชนิดผง*

สรุป: *การรับประทานขิงชนิดผงช่วยลดอาการท้องอืดในผู้ป่วยที่ได้รับการผ่าตัดเอามดลูกออกทางหน้าท้อง จากโรคทางนรีเวชที่ไม่ใช่มะเร็งได้*

คำสำคัญ: ขิง, การผ่าตัดโรคทางนรีเวชที่ไม่ใช่มะเร็ง, ภาวะลำไส้อืดหลังการผ่าตัด

Introduction

Hysterectomy is one of the most commonly performed procedures by gynecologists, second only to cesarean section[1]. It can be performed through three main approaches: vaginally, laparoscopically, or abdominally.

Globally, approximately 6.1 to 8.6 per 1,000 women undergo a hysterectomy[2]. Postoperative ileus (POI) is a common complication among patients undergoing abdominal surgeries. Postoperative ileus occurs in up to 25% of patients following elective abdominal surgery[3]. Symptoms of postoperative ileus (POI) include nausea, vomiting, delayed passage of flatus and stool, abdominal distention and abdominal tenderness[3]. The hallmark of postoperative ileus is a delayed bowel movement or passage of flatus[4]. Findings from physical examination are generally non-specific, but patients often present with a distended, tympanic abdomen and absent bowel sounds[4]. The diagnosis of postoperative ileus is based on clinical assessment[4]. Postoperative bowel ileus can result in prolonged hospital stays, increased postoperative pain, and impaired wound healing, potentially delaying mobilization. Several methods can help prevent POI, including early postoperative feeding, correcting electrolyte imbalances, prophylactic nasogastric tube insertion, bowel preparation, analgesia, prokinetics, and gum chewing[5–7]. However, no agent has been proven effective in preventing this condition[3]. In addition to early ambulation, laxatives, and antiflatulent drugs, in order to relieve abdominal distention, some patients try alternative treatments such as ginger[8].

Ginger, the rhizome of Zingiber officinale, belongs to the Zingiberaceae family and has long been used as a spice worldwide[9]. Previous studies have reported the anti-inflammatory, antioxidative and antitumor properties of ginger[7]. Ginger, as a dietary agent, has a carminative effect that reduces pressure on the lower esophageal sphincter, decreases intestinal cramping, and prevents flatulence, bloating and dyspepsia[10–12]. Ginger is used to relieve abdominal distention, nausea and vomiting[9,13]. Ginger can also alleviate flatulence and constipation by enhancing gastrointestinal motility[14,15].

Ginger is classified as “generally recognized as safe” by the U.S. Food and Drug Administration, and the German Commission E Monographs indicate that ginger has no known adverse side effects or interactions with drugs or herbs[16].

To date, no clinical trials have investigated the use of oral ginger powder for preventing postoperative ileus after benign gynecologic hysterectomy. Therefore, the primary aim of this study was to evaluate the time to first flatus in patients after hysterectomy. Secondary aims included assessing the time to first defecation, length of hospital stay, postoperative vomiting, and any adverse events related to oral ginger powder administration.

Materials and Methods

This randomized, double-blinded, placebo-controlled trial was performed at the Department of Obstetrics and Gynecology, Khon Kaen Hospital between July 2023 and May 2024. This study received approval from the Khon Kaen Hospital Institutional Review Board for Human Research (reference: KEF66016).

Recruited patients included those diagnosed with benign gynecological conditions and scheduled for abdominal hysterectomy with or without adnexal surgery. Patients were excluded if they had (a) a history of carminative drug use, (b) allergy to ginger, (c) reoperation within 24 hours, (d) immobility such as being on a ventilator, unconsciousness, or in shock, (e) intraoperative complications involving the gastrointestinal organs, kidneys, ureters or urinary bladder system, (f) underlying gastrointestinal disease such as gastroesophageal reflux disease and dyspepsia, (g) underlying chronic kidney disease

(glomerular filtration rate < 30 ml/min/ 1.73 m^2), (h) use of anticoagulants such as warfarin, (i) postoperative flatus before the start of the intervention, (j) underlying respiratory disease such as chronic obstructive pulmonary disease, asthma, or lung cancer, (k) peripheral arterial occlusion disease, (l) an operative time > 3 hours, (m) a low albumin level (< 3.5 g/dL), or (n) intraabdominal infection. The patients were informed about the study by the research assistant at the gynecological out-patient department before recruitment. Written informed consent was obtained from each participant in the gynecological ward prior to enrollment at the gynecological ward after recruitment.

Post-hysterectomy women who met the eligibility criteria were randomly assigned to one of two groups: the ginger group or the control group. A randomization scheme was generated using a random number table with a block of four technique and allocation concealment using sequentially opaque envelopes. Baseline characteristics were recorded: age, body mass index (BMI), underlying disease, prior abdominal surgery, type of skin incision, operative procedure, postoperative diagnosis, operative time, estimated blood loss, length of skin incision, perioperative blood transfusion and time to ginger administration. All patients were managed using the same postoperative protocols, in which laxative and antiflatulent medications were not routinely prescribed. The postoperative feeding regimen was standardized, starting with a liquid or soft diet on the first postoperative day (within 24 hours after surgery), followed by a solid or regular diet within the next 24 hours, as tolerated.

Ginger (Zingiber officinale Roscoe, 500 mg per capsule) (KMP, Thailand) was assigned to the treatment group, while a corresponding placebo was given to the control group. The drugs and placebo, which were identical in color, shape and size were prepared by a pharmacist not involved in the study. As soon as the inclusion criteria were met by a study subject, the nurses proceeded to select an opaque envelope that was sequentially numbered. To ensure randomization, each opaque envelope contained 18 capsules of either ginger or placebo and was sequentially labeled. The envelopes were distributed in numerical order, and both the study participants and health care providers were blinded to the treatment assignment.

The treatment began once the participants started drinking water. The drug dose was two capsules taken three times daily after meals and continued for three days[17]. Treatment assignments remained concealed until the data collection was complete. All participants were admitted to the gynecological ward, and if there were no postoperative complications, they were discharged three days after the operation.

The primary outcome was the time to first flatus (hours) defined as the interval from the end of the operation to the first observed passage of flatus.

The secondary outcomes were assessment of (a) time to first defecation (hours) defined as the interval from the end of the operation to the first observed passage of defecation; (b) length of hospital stay (hours) calculated from the end of the surgery to the time of discharge; (c) postoperative vomiting measured by the number of episodes per day and evaluated once daily from postoperative days 1 to 3, with vomiting occurring more than 5 minutes apart considered as an independent event and recorded separately; (d) adverse events, including heartburn, diarrhea, etc.; and (e) additional antiflatulent/laxative drug requirements.

The sample size, which was calculated based on a pilot study of 30 patients, required 56 participants (28 in each group) to achieve an alpha level of 0.05 and a power of 90%, and to account for a 10% dropout rate.

Statistical analysis was conducted using SPSS version 29. Categorical variables were analyzed with the Fisher's exact test or chi square test, while

continuous variables were assessed using the student's t-test. The primary outcome was presented as mean ± standard deviation with a 95% confidence interval. The Kaplan-Meier survival analysis was used to analyze the time to first flatus and defecation after surgery. A p value of less than 0.05 was considered statistically significant, and the trial analysis was performed using intent-to-treat (ITT) analysis.

Results

There were 106 eligible women scheduled for abdominal hysterectomy with or without adnexal surgery who were enrolled into the study. Fifty of them were excluded from the study: 23 because of postoperative flatus before the start of the intervention, 10 because they had underlying dyspepsia, 7 because they had a history of carminative drug use within one month, 5 due to having a serum albumin level < 3.5 g/dL, 2 because of underlying chronic kidney disease (CKD), 2 because of use of warfarin, and 1 because of underlying asthma.

A total of 56 eligible women were randomly assigned to two groups: 28 received ginger and 28 received the placebo. There were no dropouts (Fig. 1). For the baseline characteristics, no significant differences were found between the two groups (Table 1).

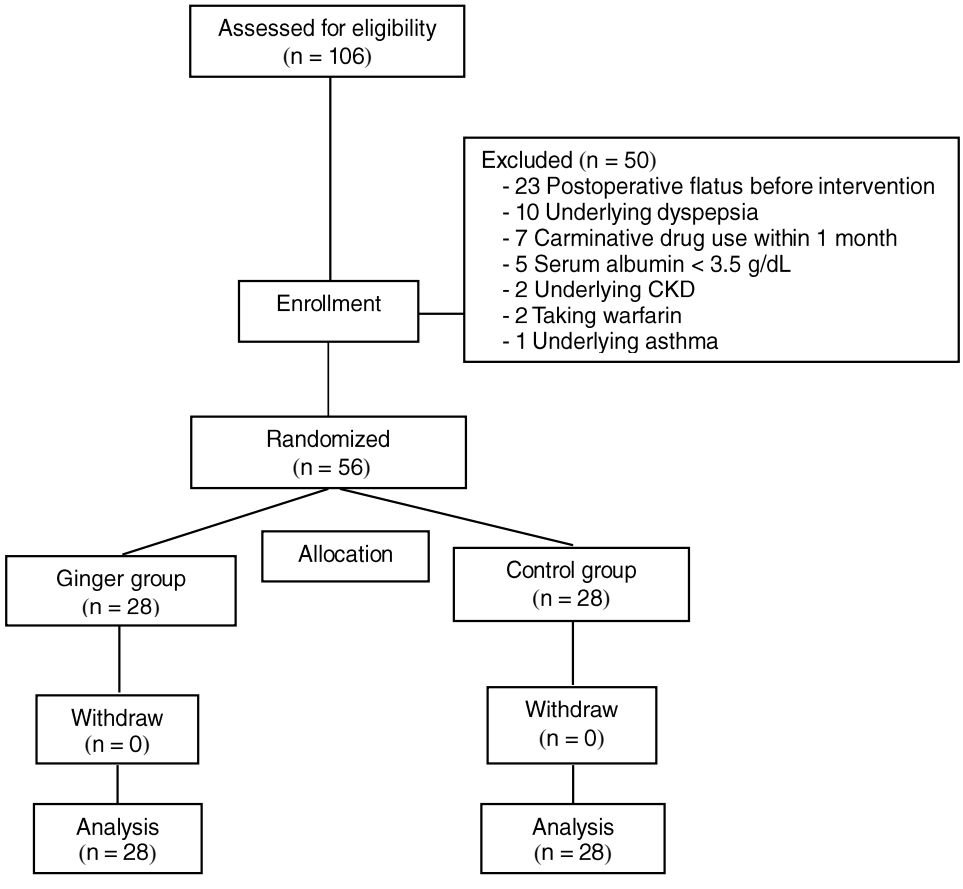

Fig. 1. Study flow diagram.

Table 1. Baseline characteristics of participants undergoing total abdominal hysterectomy for benign gynecologic conditions.

Baseline characteristics	Ginger group (n = 28)	Control group (n = 28)	p value
Age (years), mean ± SD	45.8 ± 4.6	48.3 ± 8.2	0.166 [a]
BMI (kg/m^2), mean ± SD	25.43 ± 4.8	24.43 ± 4.6	0.438 [a]
Underlying diseases, n (%)			
Diabetes mellitus	3 (10.7)	2 (7.1)	0.639 [b]
Hypertension	2 (7.1)	3 (10.7)	0.639 [b]
Others	4 (14.3)	4 (14.3)	1.000 [b]
Prior abdominal surgery, n (%)			
Yes	12 (42.9)	9 (32.1)	0.408 [b]
No	16 (57.2)	19 (67.9)	
Type of skin incision, n (%)			0.342 [b]
Low midline	8 (28.6)	5 (17.9)	
Pfannenstiel	20 (71.4)	23 (82.1)	
Operative procedure, n (%)			0.365 [b]
TAH with BS	6 (21.4)	9 (32.1)	
TAH with BSO	22 (78.6)	19 (67.9)	
Postoperative diagnosis, n (%)			0.135 [c]
Uterine myoma	16 (57.2)	20 (71.4)	
Adenomyosis	10 (35.6)	4 (14.4)	
CIN III	0 (0.0)	2 (7.1)	
Endometrial hyperplasia	1 (3.6)	0 (0.0)	
Ovarian tumor	1 (3.6)	2 (7.1)	
Operative time (min), mean ± SD	103.7 ± 21.9	90.6 ± 22.0	0.300 [a]
Estimated blood loss (ml), mean ± SD	191.4 ± 41.8	129.4 ± 21.3	0.193 [a]
Length of incision (cm), mean ± SD	12.5 ± 1.0	12.8 ± 1.2	0.353 [a]
Perioperative blood transfusion, n (%)	1 (3.6)	2 (7.1)	0.352 [c]
Time to ginger/placebo administration (hours)*, mean ± SD	18.7 ± 2.3	19.1 ± 1.9	0.498 [a]

[a] Two sample t test, [b] chi square test, [c] Fisher's exact test
SD: standard deviation, BMI: body mass index, TAH: total abdominal hysterectomy, BS: bilateral salpingectomy, BSO: bilateral salpingo-oophorectomy, CIN: cervical intraepithelial neoplasia
* Time from end of operation to start of intervention (hours)

Time to first flatus was significantly lower in the ginger group than in the control group (29.5 ± 10.0 vs 38.9 ± 8.6 hours, mean difference (MD) 9.31 hours, 95% confidence interval (CI) 4.2-14.3, p < 0.001) (Table 2), and time to first defecation was significantly lower in the ginger group than in the control group (45.8 ± 9.1 vs 58.5 ± 14.7 hours, MD 12.6 hours, 95%CI 4.5-20.8, p = 0.003) (Table 2).

Table 2. Primary and secondary outcomes.

Results	Ginger group (n = 28)	Control group (n = 28)	Mean difference 95%CI	p value
Time to first flatus (hours), mean ± SD	29.5 ± 10.0	38.9 ± 8.6	9.31 (4.2-14.3)	< 0.001[a]
Time to first defecation (hours), mean ± SD	45.8 ± 9.1	58.5 ± 14.7	12.6 (4.5-20.8)	0.003 [a]
Length of hospital stay (hours), mean ± SD	70.3 ± 5.5	76.8 ± 21.3	6.6 (1.8-14.9)	0.120 [a]
Postoperative vomiting, n (%)				
Day 1	1 (3.6)	3 (10.7)		0.611 [c]
Day 2	0 (0.0)	1 (3.6)		0.500 [c]
Day 3	-	-		-
Adverse events, n (%)	0 (0.0)	3 (10.7)		0.236 [c]
Diarrhea	4 (14.3)	7 (25.0)		0.313 [b]
Additional antiflatulent drug requirements, n (%)	0 (0.0)	2 (7.1)		0.491 [c]
Additional laxative drug requirements, n (%)				
Lactulose	0 (0.0)	2 (7.1)		0.491[c]
Milk of magnesia	0 (0.0)	1 (3.6)		0.500 [c]

[a] two sample t test, [b] chi square test, [c] Fisher's exact test
CI: confidence interval, SD: standard deviation

The Kaplan-Meier survival analysis of time to first flatus between groups is presented in Fig. 2. The respective median survival time to first flatus after surgery (50%) in the ginger group and control group was 26.5 hours (95%CI 21.1-32.5) vs 39.33 hours (95%CI 31.7-44.7, p = 0.007) and time to first defecation between groups is presented in Fig. 3, in which the respective median survival time to first defecation after surgery (50%) in the ginger group and control group was 44.7 hours (95%CI 42.0 to 47.6) vs 59.7 hours (95%CI 51.7 to 64.7, p = 0.012). There were no statistically significant differences between the ginger group compared to the control group regarding (a) length of hospital stay, (b) postoperative vomiting, (c) adverse events, and (d) additional antiflatulent/laxative drug requirements. Moreover, we found no serious adverse effects related to the use of ginger.

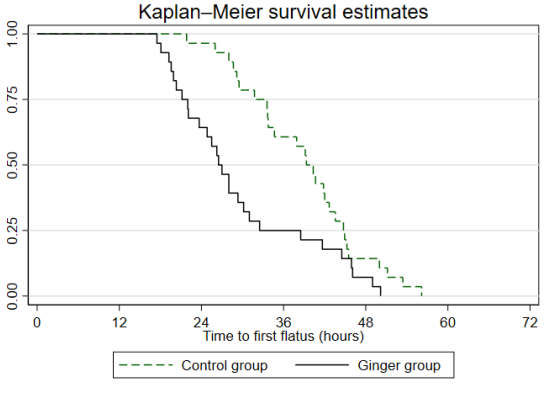

Fig. 2. The Kaplan-Meier survival analysis of time to first flatus.

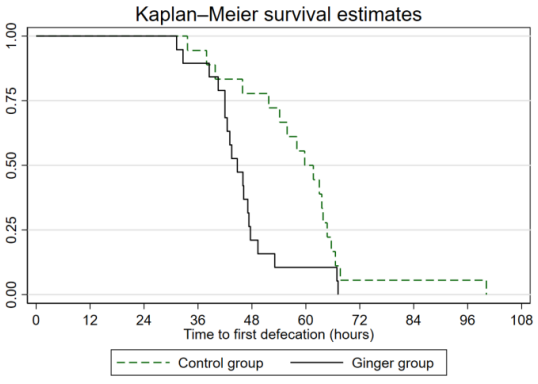

Fig. 3. The Kaplan-Meier survival analysis of time to first defecation.

Discussion

This study was a randomized, double blinded, placebo-controlled trial to evaluate the efficacy of oral ginger powder for prevention of postoperative bowel ileus in benign gynecologic abdominal hysterectomy. The study demonstrated that ginger enhanced the recovery of gastrointestinal function following surgery by significantly shortening the time to first flatus compared to that of the placebo group (29.5 ± 10.0 vs 38.9 ± 8.6 hours) and significantly reduced the time to first defecation in the ginger group more than in the placebo group (45.8 ± 9.1 vs 58.5 ± 14.7 hours). The average time to first flatus and defecation in the ginger group were shorter than those in the placebo group, which supports the hypothesis that oral ginger powder can effectively reduce postoperative bowel ileus in benign gynecologic hysterectomy. Based on the results of reducing POI, a possible explanation can be that the ginger increases gastrointestinal motility.

In contrast, Pongsupanimit et al[20] demonstrated that ginger supplementation did not significantly reduce the incidence of postoperative ileus (POI) or enhance bowel function recovery following hysterectomy under the Enhanced Recovery After Surgery (ERAS) protocol[20]. These differences may be attributed to several factors. First, early initiation of feeding and intervention differed between 3–4 hours after surgery in Pongsupanimit et al's study and 18–19 hours postoperation in our study. Early postoperative oral feeding has been shown to reduce POI by accelerating intestinal motility[19]. Second, the target population in our study was focused solely on patients with benign gynecological conditions undergoing total abdominal hysterectomy (TAH). At the same time, Pongsupanimit et al[20] included patients with benign or malignant gynecological conditions undergoing TAH or total laparoscopic hysterectomy (TLH). Malignant conditions often involve greater intestinal manipulation than benign conditions during surgery, which can affect bowel recovery. Third, anesthetic methods in Pongsupanimit et al[20] included patients receiving general anesthesia and/or spinal block with morphine, whereas our study included patients under general anesthesia. Indicating that various anesthetic methods can impact gastrointestinal recovery, leading to differing outcomes. However, the results of our study indicated a longer time to the first flatus compared to Pongsupanimit et al[20] findings, likely due to their use of the ERAS protocol, which has been shown to promote a rapid return of bowel function[21].

Our research findings were similar to those of Tianthong et al[17]. Their previous study showed that oral ginger powder can relieve abdominal distention after cesarean sections under spinal anesthesia. Despite these differences in types of surgery and anesthesia, both studies found that ginger effectively reduced postoperative abdominal distention.

A systematic review and meta-analysis18 of fourteen clinical trials showed the beneficial effects of ginger on postoperative nausea and vomiting, which

is one symptom of POI, and ginger is widely used as an antiemetic and is effective in reducing postoperative nausea and vomiting and relieving nausea and vomiting in pregnancy. Our study showed that postoperative vomiting tended to be less in the ginger group, even though not statistically significant. These results differed from another meta-analysis[19] that reported ginger significantly preventing postoperative nausea and vomiting, perhaps explained by differences in types of operation, dosage of ginger administration and time to start diet. The difference in the dosage and schedule of this study and the systematic review and meta-analysis Chaiyakunapruk et al[19] was that the administration of at least 1 gm of ginger one hour before the induction of anesthesia was found to prevent postoperative vomiting (POV). Therefore, the administration schedule before an operation can be a crucial factor for the most potent efficiency of ginger in preventing POV. Additionally, there was a low incidence of vomiting in this study, and the optimal sample size was calculated according to the primary outcome, the time of the first flatus. Therefore, further research on the effectiveness of postoperative administration of ginger on POV in patients who undergo TAH may be required.

However, the length of hospital stay was not significantly different between the two groups. The explanation may be that the POI symptoms in these patients did not induce serious events. All the patients presented mild discomfort symptoms of bloating and flatulence, which can be relieved by ginger and additional antiflatulence medicine. Moreover, the objective of this research was to study patients with benign gynecologic conditions who underwent TAH without serious intraoperative events, including bowel injury. Therefore, the effect of ginger on these POI symptoms did not directly impact the length of hospital stays.

The strength of this study was that it is the first randomized, double blinded, placebo-controlled trial of time to first flatus and defecation, which are two clinical symptoms of POI.

There were some limitations of this study. First, it was carried out at a single center. Second, the study was conducted within a group with benign gynecologic conditions.

However, we suggest that further research on the use of ginger powder should be conducted in relation to other POI symptoms and under other gynecologic conditions in order to generalize its efficacy.

Conclusion

The administration of postoperative oral ginger powder, at a dose of 500 milligrams per capsule, two capsules after meals three times a day, continued for three days after surgery, could prevent POI by enhancing bowel motility, which decreased the time to first flatus and defecation. Thus, oral ginger powder can be used a treatment to prevent POI in benign gynecologic abdominal hysterectomy that has no serious adverse events. Ginger may therefore be used as an alternative method in the prevention of POI in post-hysterectomy patients.

Acknowledgements

We would like to thank (a) the participants for their cooperation, (b) the ward nursing staff and the physicians for their assistance, (c) the staff from the Obstetrics and Gynecology Department at Khon Kaen Hospital for their support, and Mr. John D. Ross for assistance with the English-language presentation of the manuscript.

Potential conflicts of interest

The authors declare no conflicts of interest.

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