

Comparison Of Ginger Decoction And Fresh Lemon Juice In Reducing Emesis Gravidarum Among First-Trimester Pregnant Women

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ABSTRACT

Background: Emesis gravidarum commonly affects women during the first trimester and may impair nutritional status and quality of life. Ginger and lemon are widely used as complementary therapies, although comparative evidence remains limited. **Objective:** To compare the effectiveness of standardized ginger decoction and fresh lemon juice in reducing emesis gravidarum. **Methods:** A quasi-experimental pretest-posttest two-group study was conducted among 30 first-trimester pregnant women at an independent midwifery practice in Medan, Indonesia. Participants received either ginger decoction (n = 15) or fresh lemon juice (n = 15) once daily for four consecutive days. Emesis severity was assessed using the Pregnancy-Unique Quantification of Emesis and Nausea (PUQE-24) questionnaire. **Results:** Both interventions significantly reduced PUQE scores ($p < 0.001$). The reduction was greater in the ginger group (5.60 points) than in the lemon group (3.87 points) ($p < 0.001$). **Conclusion:** Both therapies effectively reduced emesis gravidarum, with ginger decoction demonstrating superior clinical effectiveness and greater potential as a complementary therapy during early pregnancy.

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INTRODUCTION

Emesis gravidarum, commonly referred to as nausea and vomiting in pregnancy (NVP), is one of the most common discomforts during early pregnancy. The condition is primarily associated with hormonal changes, particularly increased levels of human chorionic gonadotropin (hCG), estrogen, and progesterone, which affect both the gastrointestinal and central nervous systems. Approximately 70–80% of pregnant women experience nausea and vomiting during the first trimester, while 1–3% develop hyperemesis gravidarum, a severe condition characterized by dehydration, electrolyte imbalance, weight loss, nutritional

deficiencies, and reduced quality of life. Therefore, early identification and effective management are essential components of antenatal care (Tan et al., 2023; RCOG, 2024; Tahergorabi et al., 2025).

In Indonesia, emesis gravidarum remains a common complaint during antenatal care. Preliminary observations at the study site showed that 26 of 38 first-trimester pregnant women (68.4%) attending antenatal visits between January and February 2026 experienced mild-to-moderate emesis gravidarum, highlighting the need for safe and evidence-based non-pharmacological interventions (Ministry of Health of the Republic of Indonesia, 2024). Among complementary therapies, ginger (*Zingiber officinale* Roscoe) and lemon (*Citrus limon* (L.) Osbeck) are widely used because of their favorable safety profiles during pregnancy. Ginger contains gingerols, shogaols, and zingerone, which reduce nausea by antagonizing serotonin (5-HT₃) receptors and improving gastric motility, whereas lemon contains limonene, citral, and linalool, which alleviate nausea through olfactory stimulation and modulation of the autonomic nervous system.

Although both interventions have demonstrated beneficial effects, previous studies have largely evaluated ginger and lemon separately using different formulations, dosages, and outcome measures, limiting direct comparison and the applicability of findings to routine clinical practice. Comparative studies using standardized preparations and validated outcome instruments in primary maternal healthcare settings remain limited, particularly in Indonesia (Hu et al., 2022; ACOG, 2023; RCOG, 2024).

This study directly compared standardized ginger decoction and fresh lemon juice using the Pregnancy-Unique Quantification of Emesis and Nausea (PUQE-24), with identical treatment duration, administration frequency, and beverage volume to ensure methodological consistency.

The novelty of this study lies in its direct comparison of two commonly recommended herbal therapies using standardized protocols and the validated PUQE-24 instrument within a real-world primary midwifery setting. The findings are expected to strengthen the evidence for complementary midwifery care and assist midwives in selecting effective non-pharmacological interventions for managing emesis gravidarum during early pregnancy.

METHOD, DATA, AND ANALYSIS

This quasi-experimental study employed a pretest-posttest two-group design to compare the effectiveness of ginger decoction (*Zingiber officinale* Roscoe) and fresh lemon juice (*Citrus limon* (L.) Osbeck) in reducing emesis gravidarum among first-trimester pregnant women. The study was conducted from March to May 2026 at an independent midwifery practice in Medan, Indonesia.

Participants were recruited using purposive sampling based on predefined eligibility criteria. Eligible participants were women with singleton pregnancies of ≤ 13 weeks' gestation who experienced mild-to-moderate emesis gravidarum, were able to communicate effectively, and provided written informed consent. Women with hyperemesis gravidarum requiring hospitalization, those receiving antiemetic medication or other herbal therapies, and those with gastrointestinal or chronic systemic diseases were excluded.

The minimum sample size was determined using Federer's formula for experimental studies, $[(t - 1)(n - 1) \geq 15]$, which indicated that at least 16 participants (8 per group) were required. To improve statistical precision and account for potential dropouts, 30 eligible participants were recruited using purposive sampling. Participants were then sequentially allocated alternately into two equal groups according to the order of recruitment until each group comprised 15 participants. The ginger group received a standardized decoction prepared from 2.5 g of fresh ginger rhizome boiled in 250 mL of water until approximately 200 mL remained, whereas the comparison group received 30 mL of freshly squeezed lemon juice diluted with 200 mL of boiled water. Both interventions were administered once daily after breakfast for four consecutive days, and participants were instructed to avoid other herbal remedies during the intervention period while continuing routine antenatal care.

The primary outcome was the severity of emesis gravidarum measured using the Pregnancy-Unique Quantification of Emesis and Nausea (PUQE-24) questionnaire before the intervention (pretest) and on the fourth day after completing the intervention (posttest). PUQE-24 scores range from 3 to 15, with higher scores indicating greater symptom severity. Ethical approval was obtained from the Health Research Ethics Committee of STIKes Flora Medan (Approval No. 481/TU/STIKes-FL/05/III/2026), and written informed consent was obtained from all participants.

Data were analyzed using IBM SPSS Statistics. Normality was assessed using the Shapiro–Wilk test. Descriptive statistics were presented as mean $\pm$ standard deviation or frequency and percentage, as appropriate. Baseline characteristics were compared using independent-samples *t*-tests and Chi-square tests, while paired-samples *t*-tests and independent-samples *t*-tests were used to evaluate within-group and between-group differences in PUQE-24 scores. Statistical significance was set at $p < 0.05$.

RESULT AND DISCUSSION

RESULT

1 Participant Characteristics

Thirty first-trimester pregnant women fulfilled the eligibility criteria and completed the study. No participant withdrew during follow-up, resulting in complete outcome data for all enrolled participants.

Table 1. Baseline Characteristics of Participants by Study Group

Characteristic	Ginger Group (n = 15)	Fresh Lemon Juice Group (n = 15)	p-value
Maternal age (years)	27,53 ± 3,48	28,13 ± 3,72	0,648
Gestational age (weeks)	11,27 ± 2,05	11,60 ± 1,88	0,631
Hemoglobin (g/dL)	11,62 ± 0,78	11,54 ± 0,82	0,781
Pre-pregnancy BMI (kg/m ²)	22,41 ± 2,37	22,08 ± 2,18	0,694
Parity, n (%)			0,713
Primiparous	9 (60,0)	8 (53,3)	
Multiparous	6 (40,0)	7 (46,7)	
Education level, n (%)			0,801
High school or equivalent	8 (53,3)	7 (46,7)	
Diploma/Bachelor's degree	7 (46,7)	8 (53,3)	
Occupation, n (%)			0,724
Housewife	10 (66,7)	9 (60,0)	
Employed	5 (33,3)	6 (40,0)	
Previous emesis (%)			0,704
Yes	3 (20,0)	4 (26,7)	
No	12 (80,0)	11 (73,3)	

A total of 30 eligible first-trimester pregnant women completed the study and were included in the final analysis. Each study group comprised 15 participants, and no participants were lost to follow-up. Continuous variables were compared using the independent-samples *t*-test, whereas categorical variables were analyzed using the Chi-square test.

Baseline demographic and obstetric characteristics are presented in Table 1. Statistical analysis demonstrated no significant differences between intervention groups regarding maternal age, gestational age, hemoglobin concentration, pre-pregnancy body mass index, parity, educational attainment, employment status, or previous history of emesis gravidarum (all $p > 0.05$). These findings indicate that both groups were comparable before intervention, thereby reducing the likelihood that baseline characteristics influenced treatment outcomes.

2 Changes in PUQE Scores Following Intervention

Both interventions significantly reduced emesis gravidarum severity after four consecutive days of treatment. The mean PUQE score in the ginger group decreased from 10.73 ± 1.22 to 5.13 ± 1.19 , representing a mean reduction of 5.60 points ($p < 0.001$). Similarly, participants receiving fresh lemon juice demonstrated a significant reduction from 10.47 ± 1.19 to 6.60 ± 1.24 , corresponding to a mean decrease of 3.87 points ($p < 0.001$).

Table 2. Change in PUQE Score Before and After Intervention

Group	Pretest	Posttest	Mean Reduction	p-value
Ginger decoction	10.73 ± 1.22	5.13 ± 1.19	5.60	<0.001
Fresh lemon juice	10.47 ± 1.19	6.60 ± 1.24	3.87	<0.001

These findings indicate that both complementary interventions effectively alleviated nausea and vomiting during early pregnancy.

3 Comparison of Intervention

Effectiveness Comparison of treatment effects revealed that participants receiving ginger decoction experienced significantly greater improvement than those receiving fresh lemon juice. The mean reduction in PUQE score was 5.60 ± 1.06 in the ginger group compared with 3.87 ± 1.02 in the lemon group. The between-group mean difference was 1.73 points, which was statistically significant ($p < 0.001$).

Table 3. Comparison of Mean Reduction in PUQE Score

Outcome	Ginger	Lemon	Mean Difference	p-value
Reduction in PUQE Score	5.60 ± 1.06	3.87 ± 1.02	1.73	<0.001

These findings suggest that although both herbal interventions were clinically beneficial, ginger decoction produced superior antiemetic effects.

DISCUSSION

This study demonstrated that both ginger decoction and fresh lemon juice significantly reduced the severity of emesis gravidarum among first-trimester pregnant women. These findings support current evidence that complementary herbal therapies are effective for managing mild-to-moderate nausea and vomiting during pregnancy and are consistent with the Royal College of Obstetricians and Gynaecologists (RCOG), which recommends non-pharmacological interventions as first-line management.

Ginger decoction produced a significantly greater reduction in PUQE-24 scores than fresh lemon juice. This superior effect is biologically plausible because ginger contains gingerols, shogaols, and zingerone, which inhibit serotonin (5-HT₃) receptors, improve gastric motility, and accelerate gastric emptying, thereby reducing nausea and vomiting. In contrast, lemon mainly acts through olfactory stimulation and modulation of the autonomic nervous system via compounds such as limonene and citral, producing a milder antiemetic effect.

These findings are consistent with previous studies. Hu et al. (2022), Tan et al. (2023), and Tahergorabi et al. (2025) reported that ginger is a safe and effective complementary therapy for pregnancy-related nausea and vomiting without increasing adverse maternal or fetal outcomes. The present study extends this evidence by directly comparing standardized ginger decoction and fresh lemon juice using the validated PUQE-24 instrument.

The study's strengths include the use of standardized intervention protocols, a validated outcome measure, and implementation in a primary midwifery practice, making the findings applicable to routine antenatal care. However, the relatively small sample size, single-center design, and the absence of control for potential confounding factors such as dietary intake, psychological stress, and sleep quality may limit the generalizability of the results. Future multicenter randomized controlled trials with larger samples are recommended. Overall, both interventions effectively reduced the severity of emesis gravidarum, but ginger demonstrated

greater therapeutic efficacy than fresh lemon juice. These findings support the use of ginger decoction as a safe, inexpensive, and practical complementary therapy for managing mild-to-moderate emesis gravidarum during early pregnancy.

CONCLUSION AND SUGGESTION

This Both ginger decoction and fresh lemon juice significantly reduced the severity of emesis gravidarum among first-trimester pregnant women. However, ginger decoction demonstrated a significantly greater reduction in PUQE-24 scores, indicating superior effectiveness. These findings support the use of ginger decoction as a safe, inexpensive, and evidence-based complementary therapy to improve maternal comfort and reduce nausea and vomiting during early pregnancy.

Midwives may consider incorporating standardized ginger decoction into routine antenatal care for women with mild-to-moderate emesis gravidarum, accompanied by appropriate counseling on its preparation and safe use. Future studies should use larger randomized controlled trials with longer follow-up periods and control for potential confounding factors to further validate these findings and strengthen the evidence for complementary midwifery practice.

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