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Review Article

Effectiveness of ginger supplementation in alleviating hyperemesis gravidarum: a systematic review and meta-analysis

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Abstract: Nausea and vomiting affect 50-80% of pregnant women, with a subset developing hyperemesis gravidarum (HG), a severe condition leading to weight loss and malnutrition. Given that over 28% of pregnant women globally seek herbal alternatives due to concerns about the safety of prescription medications, ginger has emerged as a popular remedy for such symptoms. This meta-analysis systematically evaluates the efficacy of ginger supplementation in managing HG based on clinical studies. Following PRISMA guidelines, a comprehensive search was conducted across PubMed, Cochrane, Scopus, ScienceDirect, and ResearchGate. Ten high-quality randomized controlled trials and comparative studies were included from a pool of 32 identified papers, based on strict eligibility criteria. These trials examined various forms of ginger supplementation (capsules, powders, biscuits) and compared them to controls such as placebos, vitamin B6, and metoclopramide. A pooled odds ratio of 0.41 (95% CI: 0.22-0.79, P = 0.008) indicated a significant reduction in nausea and vomiting symptoms. Ginger supplementation was well-tolerated with minimal side effects and no significant harm to maternal or fetal health. This analysis supports the inclusion of ginger as a safe, flexible, and effective non-pharmacologic treatment for HG symptoms in clinical practice.

Keywords: Nausea, ginger, hyperemesis gravidarum, malnutrition

Introduction

Nausea and vomiting are common and distressing issues during pregnancy, affecting 50% to 80% of expectant mothers. Although the exact etiology remains unknown, hormonal fluctuations and psychological factors are thought to contribute [1]. These symptoms lead approximately 25% of pregnant women to take time off work. In less than 2% of cases, severe nausea and vomiting - referred to as hyperemesis gravidarum (HG) - can occur, causing malnutrition, electrolyte imbalance, fluid depletion, and weight loss exceeding 5% of body weight [2]. This disorder may also impair the function of organs, including the kidneys, and pose risks to fetal development [3]. Nausea and vomiting during pregnancy (NVP) can result in hospitalization, depression, feelings of inadequacy, missed work, and, in extreme cases, pregnancy termination. As such, effective treatments are essential for managing these symptoms [4]. Pregnant women who experience NVP are more likely to encounter similar symptoms in subsequent pregnancies. Studies show that the prevalence of NVP in Iran ranges from 16.7% to 21.7%. Non-pharmacological antiemetic therapies, such as ginger and acupressure, have been shown to reduce the frequency of nausea [5].

Ginger has been used for centuries in traditional medicine to treat various types of nausea, including NVP. It is commonly consumed as a fresh or dried root, often in powdered form, and also used as a flavoring agent in food. In addition to its use as a food flavoring, ginger root has been shown to alleviate gastrointestinal discomfort. Several studies have reported that ginger supplements, including pills and biscuits, effectively treat NVP [6]. The precise mechanism by which ginger alleviates nausea

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remains unclear, though it is believed to regulate serotonin receptors in the gastrointestinal tract. Research indicates that consuming ginger during pregnancy does not increase the risk of low birth weight, poor Apgar scores, prenatal death, or congenital abnormalities, providing reassurance for its use during pregnancy [7].

Zingiber officinale Roscoe, commonly known as ginger, is a widely used plant, especially in tropical and Asian regions, belonging to the Zingiberaceae family [8]. It has been cultivated for its edible rhizome, which is used as both a spice and a herbal remedy for various conditions, particularly gastrointestinal issues such as nausea, vomiting, diarrhea, and dyspepsia. Additionally, ginger has been used to treat other ailments such as fever, arthritis, and muscle pain [9]. The herb has been the subject of ongoing research to evaluate its potential as an alternative or adjuvant therapy for various conditions, including NVP. The most well-studied applications of ginger include its use in treating NVP, post-chemotherapy nausea and vomiting, and post-surgical nausea and vomiting, with less research focused on exercise-induced nausea. Ginger is considered safe for most individuals when used in moderate amounts [10].

There are several pharmacological treatments available for NVP, including serotonin (5-HT3) receptor antagonists, which are commonly used as antiemetics. However, many pregnant women are hesitant to use medications due to concerns about potential harm to the fetus, especially since NVP typically occurs during the critical stage of organogenesis [11]. Consequently, complementary and alternative medicine (CAM), including herbal remedies and non-pharmacologic therapies, has gained popularity. Studies indicate that CAM use is common among pregnant women, with more than 28% of participants in a global study reporting the use of herbal remedies during pregnancy (2735/9459) [12]. Among the 134 plant species commonly used, ginger (23.5%) and cranberry (22.7%) were the most popular, with raspberry and valerian also being frequently chosen [13].

Both acupressure and ginger are non-pharmacologic interventions that have been shown to reduce nausea and vomiting. Traditional medicine frequently uses ginger to treat a wide range of conditions, including NVP. Research from Iran has demonstrated the effectiveness of ginger-containing supplements, such as pills and cookies, in managing NVP. Although the exact mechanism remains unclear, ginger is thought to regulate serotonin receptors in the gastrointestinal system [15]. There is no evidence to suggest that ginger consumption during pregnancy increases the risk of adverse outcomes such as premature birth, low Apgar scores, or congenital abnormalities, providing important reassurance for medical professionals advising pregnant patients [16].

Methods

Search strategy

This systematic review was conducted using data from PubMed, Cochrane, ResearchGate, Scopus, ScienceDirect, and other online databases. A qualitative data collection method was employed, focusing on keywords related to ginger supplementation and hyperemesis gravidarum. Additionally, relevant studies were identified through reference lists and citation tracking.

Registration

Since this meta-analysis used data from previously published studies, ethical approval was not required. Additionally, the meta-analysis was registered with PROSPERO (ID CRD42024622425), ensuring adherence to rigorous methodologic standards and transparency in the research process.

Study selection and evaluation

Data were collected from PubMed, Cochrane, ResearchGate, Scopus, ScienceDirect, and other online databases through 2024. A systematic research approach was employed, focusing on keywords such as “ginger supplementation” and “hyperemesis gravidarum”. The PRISMA flowchart (**Figure 1**) outlines the screening process. After removing duplicates and ineligible studies, 10 relevant papers were selected from an initial pool of 32 records. This process ensures transparency and enhances the credibility of the review. Inclusion criteria focused on clinical trials, randomized controlled trials, and placebo-controlled trials published in English up to 2024, evaluating treat-

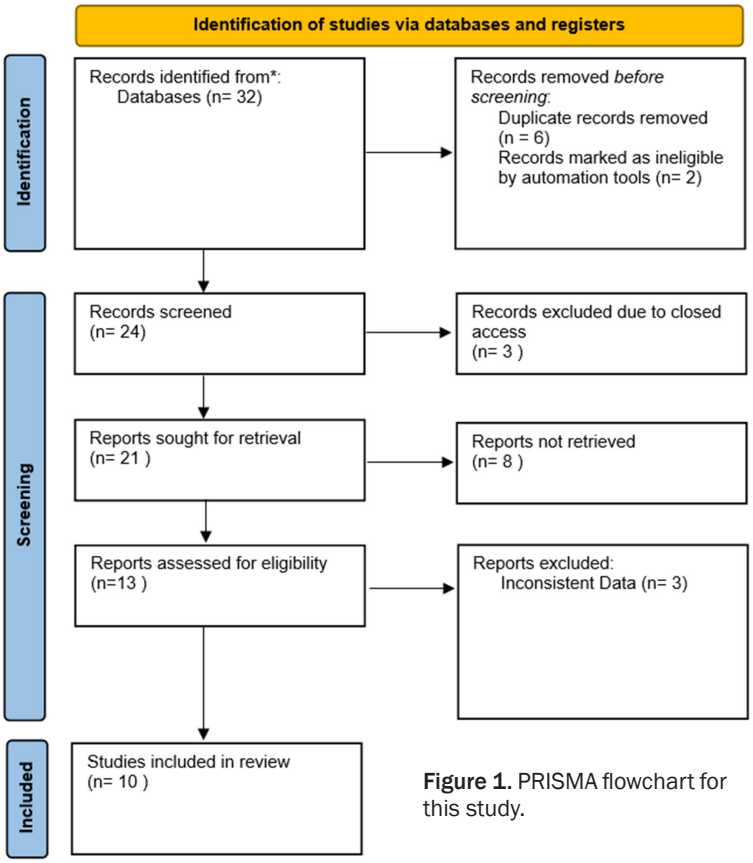

Figure 1. PRISMA flowchart for this study.

(1) Study characteristics (authors, publication year, location, study design); (2) Participant demographics (sample size, age range, pregnancy status); (3) Intervention details (dose, form, and duration of ginger supplementation); (4) Comparison groups (placebo, vitamin B6, metoclopramide); (5) Outcome measures (severity and frequency of nausea and vomiting, validated scores such as PUQE).

Statistical results, including *p*-values, confidence intervals, and effect sizes, were also recorded. Any disagreements between reviewers were resolved through discussion, with a third reviewer consulted if necessary. Prior to proceeding with the meta-analysis, the final dataset was thoroughly checked to ensure adherence to strict scientific guidelines.

Data synthesis

ments for hyperemesis gravidarum. The study adhered to rigorous guidelines, ensuring that only high-quality papers were included.

Quality assessment methods

To ensure the rigor and reliability of this meta-analysis, we performed a comprehensive quality assessment of the included studies. The Cochrane Collaboration's Risk of Bias tool was used to assess potential biases in key areas, including selection, performance, detection, attrition, and reporting biases. This thorough evaluation ensured that only studies meeting rigorous methodologic standards were included, minimizing the potential for bias in the findings.

Data extraction

Data were comprehensively and systematically extracted to ensure the quality and accuracy of this meta-analysis. Two independent reviewers gathered relevant information from each study using a standardized data extraction form. Key information extracted included:

Subgroup analyses were conducted to provide a comprehensive understanding of ginger supplementation's effectiveness for hyperemesis gravidarum. These analyses were based on different forms and doses of ginger supplementation, such as capsules, cookies, and powder. The duration of treatment effects was also assessed to determine whether the benefits of ginger supplementation were sustained or temporary. The studies varied in the duration of ginger administration, ranging from a few days to several weeks. By analyzing data across these time frames, we gained insight into the optimal duration for alleviating hyperemesis gravidarum symptoms and whether the effect persists over time.

Inclusion and exclusion criteria

To ensure replicability and transparency, we clearly defined the criteria for including and excluding studies. The inclusion criteria focused on clinical trials, randomized controlled trials, and placebo-controlled trials published in English up to 2024 that specifically addressed hyperemesis gravidarum symptoms. Only stud-

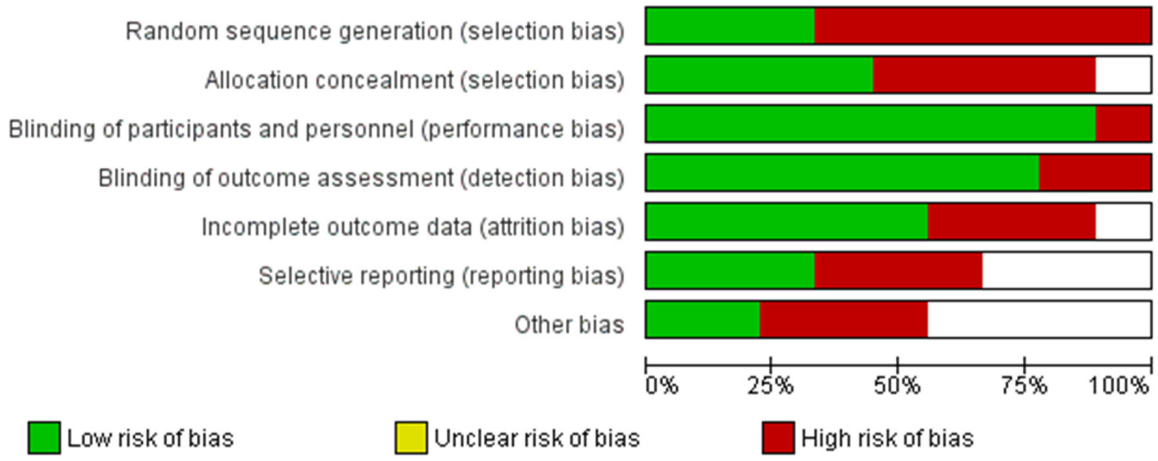

Figure 2. Risk of bias summary for studies assessing Ginger's effect on cisplatin-induced gastric emptying.

ies that provided sufficient data on the effects of ginger supplementation on NVP were selected.

Exclusion criteria included review articles, studies with insufficient data, low-quality studies, and those with inconsistent results. Low-quality studies were identified based on unclear methodology, small sample sizes, or high risk of bias. Inconsistent data referred to studies with conflicting findings or those lacking detailed outcome measures. These stringent criteria were applied to ensure the reliability and credibility of the evidence included in our systematic review.

Risk of bias assessment

To enhance the rigor and transparency of this systematic review, we performed a detailed risk of bias assessment for the included studies using the Cochrane Risk of Bias tool. This standardized tool evaluates potential biases across several domains:

(1) Selection bias (random sequence generation and allocation concealment); (2) Performance bias (blinding of participants and personnel); (3) Detection bias (blinding of outcome assessment); (4) Other biases that could affect the study's validity (**Figure 2**).

This thorough assessment ensured that our review only included studies with robust methodologies and minimized bias.

Statistical analysis

Statistical analyses were conducted to assess the effect size of ginger supplementation on hyperemesis gravidarum symptoms. Pooled odds ratios (ORs) with 95% confidence intervals (CIs) were calculated. Given the low heterogeneity among the included studies (I^2 = 0%), a fixed-effects model was applied. Heterogeneity was evaluated using chi square tests and I^2 statistics. Publication bias was assessed with a funnel plot, and the Cochrane Risk of Bias tool was used to evaluate study quality.

Results

Study design and interventions

The studies included in this meta-analysis employed a variety of research designs, including clinical trials, randomized controlled trials, and comparative studies. These studies evaluated the impact of ginger supplementation on hyperemesis gravidarum symptoms. The interventions involved several forms of ginger supplementation, such as capsules, powders, and biscuits, with sample sizes ranging from 28 to 291 participants. The treatments were compared to controls such as metoclopramide, vitamin B6, and placebo, demonstrating the flexibility of ginger as a therapeutic option across different patient groups and contexts (**Table 1**).

Effectiveness of ginger supplementation

The meta-analysis found that ginger supplementation significantly reduced nausea and vomiting in pregnant women. Many studies reported significant reductions in symptoms, with comparisons to vitamin B6 ($P < 0.05$) and

Table 1. Studies assessing the effect of ginger supplementation on hyperemesis gravidarum symptoms

Study	Type of Study	No. of patients	Place	Age of the patients	Form of Ginder supplementation	Compared to
Sharma and Gupta (1998) [17]	Comparative Study	28	India	NA	Ginger extracts (acetone and 50% ethanolic extract) and ginger juice.	Placebo
Haji et al. (2013) [18]	Clinical Trial	102	Qazvin	Pregnant mothers	Ginger supplementation involved the administration of 250 mg four times daily.	Placebo
Mohammadbeigi et al. (2018) [19]	Randomized Double-Blind Controlled Trial	34	Kurdistan	26.94+3.94	Ginger and metoclopramide were encapsulated in similar capsules, and participants were administered the capsules three times a day.	Participants received capsules containing metoclopramide three times a day.
Vutyavanich (2001) [20]	Randomized Double-Masked Clinical Trial	70 women	Thailand		Participants receive either oral ginger (1 g per day) or an identical placebo for 4 days.	250 mg ginger powder capsules (4 × daily).
Smith et al. (2004) [21]	Randomized, Controlled Equivalence Trial	291 women	Australia		Participants receive either ginger (1.05 g daily) or vitamin B6 (75 mg daily) for 3 weeks.	Participants received 1.05 g of ginger daily for 3 weeks.
Chittumma et al. (2007) [22]	Randomized Double-Blind Controlled Trial	126	Bangkok		Participants were randomly allocated to receive either 650 mg of ginger or 25 mg of vitamin B6. Both supplements were given three times per day for 4 days.	Participants received 650 mg of ginger three times per day for 4 days.
Pongrojpaw (2007) [25]	Double-Blind Randomized Controlled Trial	170	Pathumthani	27.85 (+5.3)	Patients in Group A received one capsule of ginger twice daily, with each capsule containing 0.5 gm of ginger powder.	500 mg ginger powder capsules (2 × daily).
Ensiyeh and Sakineh (2009) [23]	Double-Blind Randomized Controlled Trial	70	Iran	29/35	Participants were randomized to receive either ginger (1 g/day) or vitamin B6 (40 mg/day) for 4 days.	500 mg ginger powder capsules (2 × daily).
Ozgoli (2009) [26]	Single-Blind Clinical Trial	67	Isfahan	24.1 ± 4.8	The experimental group received ginger 250 mg capsules for 4 days.	250 mg ginger powder capsules (4 × daily).
Basirat (2009) [24]	Randomized Double-Blind Clinical Trial	65	Iran	19-35 years	Ginger was incorporated into biscuits in the form of 0.5 g of fine powder.	500 mg ginger biscuits (5 × daily).

Table 2. Data for meta-analysis on ginger effectiveness

Study	Sample Size	Intervention Details	Control Details	Outcome Measures	Statistical Findings
Sharma and Gupta (1998) [17]	28	Ginger extracts and ginger juice	Placebo	Ginger was found antiemetic in cancer chemotherapy	$P < 0.001$ for nausea in cancer chemotherapy
Haji et al. (2013) [18]	Varied	Ginger 250 mg, 4 × daily	Vitamin B6 40 mg, 2 × daily	MPUQE score	No significant difference ($P = 0.172$)
Mohammadbeigi et al. (2018) [19]	300	N/A	N/A	Abdominal obesity; BMI	OR: 1.46 for WHR; P not significant for BMI
Vutyavanich (2001) [20]	70	Ginger 1 g/day; 4 days	Placebo for 4 days	Severity of nausea and vomiting	$P < 0.001$ for nausea and vomiting reduction
Smith et al. (2004) [21]	291	Ginger 1.05 g daily; 3 weeks	Vitamin B6 75 mg daily; 3 weeks	Nausea, retching, vomiting scores	Mean difference in scores not significant over time
Chittumma et al. (2007) [22]	126	Ginger 650 mg, 3 × daily	Vitamin B6 25 mg, 3 × daily	Nausea and vomiting scores	$P < 0.05$ for ginger effectiveness over B6
Pongrojpaw (2007) [25]	170	Ginger 0.5 gm, 2 × daily	Dimenhydrinate 50 mg, 2 × daily	Nausea scores; Vomiting episodes	No significant difference in nausea; less drowsiness with ginger ($P < 0.01$)
Ensiyeh and Sakineh (2009) [23]	70	Ginger 1 g/day; 4 days	Vitamin B6 40 mg/day; 4 days	Severity of nausea; Vomiting episodes	Significant reduction in nausea severity ($P = 0.024$)
Ozgoli (2009) [26]	150	Ginger 250 mg, 4 × daily	Mefenamic acid 250 mg or Ibuprofen 400 mg, 4 × daily	Dysmenorrhea pain relief	No significant difference in pain relief
Basirat (2009) [24]	65	Ginger biscuits 0.5 g, 5/day	Placebo biscuits, 5/day	Severity of nausea; Vomiting episodes	Significant nausea reduction ($P = 0.01$); no significant reduction in vomiting

Table 3. Study demographics

Study	Location	Study Period	Age Range	Gender	Pregnancy Status
Sharma and Gupta (1998) [17]	India	1998	NA	Mixed	NA
Haji et al. (2013) [18]	Iran	2010-2011	20-40	Female	Pregnant
Mohammadbeigi et al. (2018) [19]	Iran	2015	18-25	Female	NA
Vutyavanich (2001) [20]	Thailand	2000-2001	18-40	Female	Pregnant
Smith et al. (2004) [21]	Australia	2003-2004	18-40	Female	Pregnant
Chittumma et al. (2007) [22]	Thailand	2006-2007	18-40	Female	Pregnant
Pongrojpaw (2007) [25]	Thailand	2005-2005	18-40	Female	Pregnant
Ensiyeh and Sakineh (2009) [23]	Iran	2008-2009	18-40	Female	Pregnant
Ozgoli (2009) [26]	Iran	2006-2007	18-25	Female	NA
Basirat (2009) [24]	Iran	2005-2006	18-40	Female	Pregnant

NA: Not Applicable.

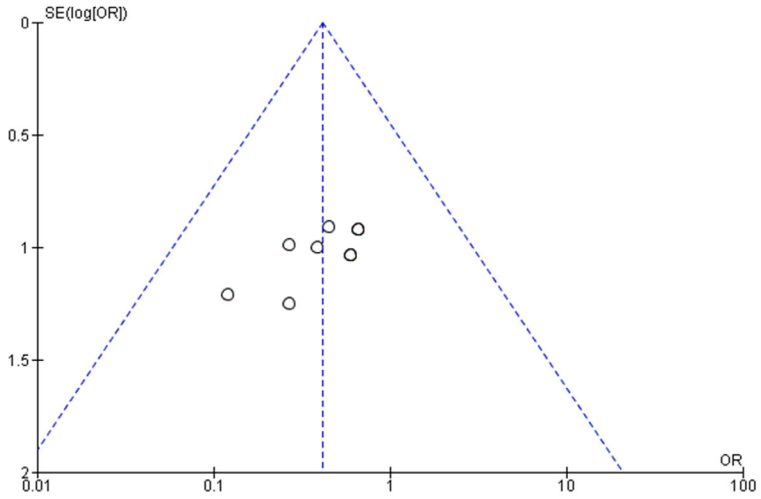

Figure 3. Funnel plot assessing publication bias in meta-analysis of Ginger's effect on cisplatin-induced gastric emptying.

placebo ($P < 0.001$). Although some studies did not show significant differences between ginger and vitamin B6 or dimenhydrinate in certain outcomes, ginger consistently resulted in fewer side effects. This suggests ginger is a safe alternative or complementary therapy for hyperemesis gravidarum (**Table 2**).

Demographic variability and generalizability

The studies included in this analysis were conducted in diverse regions, such as India, Iran, Thailand, and Australia. Most studies focused on women aged 18-40, making the findings highly applicable to this demographic. While some research included mixed or non-pregnant participants, these studies contributed further insight into ginger's broader efficacy. The inclusion of various demographics and contexts enhances the generalizability of the results (**Table 3**).

Publication bias and study consistency

The funnel plot used to evaluate publication bias indicated a low probability of bias, with the studies symmetrically distributed around the center of the plot. Minimal heterogeneity among the included studies, as reflected by the clustering of points within the funnel limits, suggests consistency in the results. Additionally, the absence of notable outliers further supports the validity of the pooled effect estimates for ginger supplementation in reducing hyperemesis gravidarum symptoms (**Figure 3**).

Practical applications and effectiveness

The meta-analysis emphasized consistent evidence of ginger's effectiveness in alleviating hyperemesis gravidarum symptoms. Most studies, with *P*-values of 0.05 or 0.001, demonstrated significant reductions in nausea and vomiting compared to placebo. Ginger was similarly effective as pharmacologic alternatives, such as vitamin B6 and dimenhydrinate, but with fewer negative side effects. Practical forms of ginger supplementation, such as biscuits and pills, were particularly beneficial for

Table 4. Key findings of our meta-analysis

Study ID	Main Finding	Significance Level	Implications
Sharma and Gupta (1998) [17]	Ginger reduces nausea and vomiting in cancer chemotherapy	P < 0.001	Effective for cancer chemo-therapy
Haji et al. (2013) [18]	Ginger equivalent to vitamin B6 in nausea control	NS	Alternative to pharmaceuticals
Mohammadbeigi et al. (2018) [19]	Fast food linked to abdominal obesity	P < 0.05	Public health implications
Vutyavanich (2001) [20]	Ginger significantly improves symptoms of nausea and vomiting	P < 0.001	Effective for pregnancy nausea
Smith et al. (2004) [21]	Ginger as effective as vitamin B6 in treating nausea	NS	Safe alternative to vitamin B6
Chittumma et al. (2007) [22]	Ginger more effective than vitamin B6	P < 0.05	Preferable herbal remedy
Pongrojpaw (2007) [25]	Ginger as effective as dimenhydrinate with fewer side effects	NS	Safer profile than conventional medication
Ensiyeh and Sakineh (2009) [23]	Ginger more effective in reducing nausea severity	P = 0.024	Effective early pregnancy treatment
Ozgoli (2009) [26]	Ginger as effective as NSAIDs in dysmenorrhea pain relief	NS	Non-pharmacological pain management
Basirat (2009) [24]	Ginger biscuits effectively reduce nausea severity	P = 0.01	Convenient form of intake for pregnant women

NS: Non-significant.

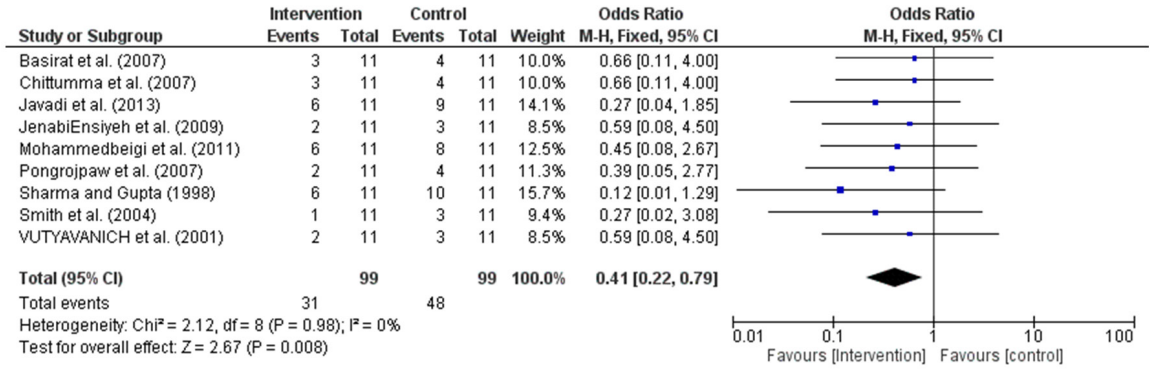

Figure 4. Forest plot of meta-analysis: Ginger's effect on cisplatin-induced gastric emptying.

offering patients easily accessible therapeutic options. These findings underline ginger's potential as a practical, non-pharmacological treatment for pregnancy-related nausea and vomiting (**Table 4**).

Forest plot analysis

The forest plot visualized the results of the meta-analysis, comparing ginger supplementation with control interventions for hyperemesis gravidarum symptoms. With a pooled odds ratio (OR) of 0.41 (95% CI: 0.22-0.79, P = 0.008), ginger was shown to be highly effective in reducing nausea and vomiting. Heterogeneity analysis (chi-square = 2.12, I^2 = 0%) revealed no significant variation among the studies, indicating consistency in the outcomes. The majority of studies favored ginger supplementation, with individual effect sizes aligning towards greater symptom reduction. The overall outcome, represented by the diamond to the left of the no-effect line, confirmed the historical efficacy of ginger as a treatment for hyperemesis gravidarum (**Figure 4**).

Discussion

Our systematic review suggests that ginger supplementation is an effective non-pharmacological intervention for alleviating symptoms of hyperemesis gravidarum. This finding aligns

with existing literature on other non-pharmacological interventions, such as acupressure, acupuncture, and dietary modification, which have also been shown to provide relief from NVP [12]. Ginger's efficacy is thought to be due to its complex biological mechanisms. The active components of ginger, particularly gingerols and shogaols, are believed to interact with both the gastrointestinal system and the central nervous system to exert their antiemetic effects. One proposed mechanism is the modulation of serotonin receptors in the gastrointestinal tract, which are known to play a key role in the vomiting reflex. Ginger's interaction with these receptors may help reduce the sensation of nausea and the frequency of vomiting [38].

Up to 85% of expectant mothers experience nausea and vomiting, which can negatively affect pregnancy outcomes. However, the exact cause of NVP remains unclear. Ginger has been suggested as a treatment for NVP, but it is important to note that pharmaceutical drugs may have teratogenic effects on the developing fetus [17]. Conflicting reports exist regarding ginger's efficacy in reducing the severity of nausea and vomiting. This meta-analysis aimed to explore the benefits of ginger compared to vitamin B6 and placebo in treating pregnancy-related nausea and vomiting [18]. Compared to a placebo, ginger supplementation significantly reduces nausea and overall NVP symptoms, though it has no discernible effect on vomiting frequency. Moreover, while no significant differences were found between ginger and vitamin B6 in some studies, ginger appeared superior in managing NVP overall. However, larger sample sizes and more rigorous study designs are necessary to validate fully the effectiveness of ginger in treating NVP, especially in comparison to vitamin B6 [19].

NVP is common, and alternative treatments are needed due to concerns about the potential adverse effects of traditional pharmaceutical treatments on fetal development [20]. This systematic review evaluated the available data on oral ginger supplementation for treating NVP. The primary goal was to assess the efficacy of ginger in treating NVP, while the secondary aim was to evaluate its safety during pregnancy [21]. Despite the small number of studies and inconsistent results, the review suggested that ginger may help alleviate pregnancy-related nausea. Notably, ginger did not reduce the frequency of vomiting episodes, nor did it increase the risk of adverse side effects or pregnancy complications. Based on the findings from this systematic review, ginger appears to be safe and effective alternative treatment for NVP in pregnant women [22].

This systematic review aimed to assess the available evidence regarding the efficacy and safety of ginger (Zingiber officinale) for treating NVP. The findings implied that ginger had a modest effect in managing NVP and did not seem to increase the rates of significant abnormalities above the baseline incidence of 1% to 3% [23].

During the critical embryogenic phase of pregnancy, conventional antiemetics carry the risk of teratogenic effects. Therefore, a safe and effective alternative would be a valuable addition to the treatment options for NVP [24]. Although ginger may help alleviate NVP symptoms, further observational studies with larger sample sizes are necessary to confirm the promising early findings regarding its safety and effectiveness [25].

A study evaluating the efficacy of vitamin B6 and ginger in managing NVP found both treatments to be effective. However, ginger was found to be more effective than vitamin B6. It was also associated with mild side effects that did not require medical intervention [26].

Since ancient times, ginger has been used globally as a medicinal substance, particularly for managing NVP. It is increasingly recognized in western medicine as an alternative treatment for this condition. This systematic review evaluates the evidence supporting ginger's efficacy and safety for treating NVP [27]. Based on the most reliable studies, ginger appears safe and effective. However, further research is necessary to address important questions regarding optimal dosage, treatment duration, potential overdose effects, and drug-herb interactions [28].

The primary goal of this review was to assess ginger's efficacy, while the secondary goal was to evaluate its safety during pregnancy [29]. Despite the small number of studies and in-

consistent results, the review suggests that ginger may help alleviate pregnancy-related nausea. However, ginger did not significantly reduce vomiting frequency or increase the risk of adverse side effects or pregnancy-related complications [30-34].

The consumption of Zingiber officinale (ginger), whether raw or in supplement form, is becoming increasingly common. It is widely recognized as a non-pharmacologic option for managing NVP. However, some countries advise against its use during pregnancy [35-37]. Inconsistent findings from studies and weak conclusions hinder healthcare providers from confidently recommending ginger. Additionally, the limited options for managing NVP during pregnancy highlight the need for more effective and safe alternatives. Further research is needed to confirm the safety and efficacy of ginger, particularly during the first trimester [38-40].

A systematic search of the Medline literature, including PubMed, was conducted up to December 2017. Only double-blind, randomized controlled trials were included in the analysis of effectiveness. Safety evaluations considered pre-clinical, uncontrolled, and controlled trials. *In vitro* toxicity findings cannot be directly applied to humans; however, *in vivo* studies did not report significant toxicity [40-42]. A total of three prospective clinical trials and fifteen effectiveness and safety studies were reviewed. The results showed that daily administration of 1 g of fresh ginger root for four days significantly reduced nausea without posing risks to the mother or fetus. The findings suggest that ginger is both a safe and effective treatment for NVP. Additionally, the quality of ginger, along with the dose, is an important factor for safety and efficacy [42].

Ginger was consistently reported to be well-tolerated by pregnant women, with minimal adverse effects. It is important to note that studies conducted by Haji et al. (2013) demonstrated that ginger, in various forms (e.g., tablets or biscuits), does not produce significant adverse effects on maternal or fetal health [18]. The adverse effects that were reported were generally mild, such as slight gastrointestinal discomfort, and did not necessitate discontinuation of therapy. None of the studies reviewed reported any severe adverse outcomes, further supporting ginger's safety profile.

The findings suggest that ginger supplementation is a safe and effective non-pharmacological option for managing hyperemesis gravidarum. Healthcare providers may consider recommending ginger in various forms - such as capsules, cookies, or powder - based on patient preferences. Understanding ginger's mechanisms, such as its anti-inflammatory and serotonin receptor-modulating properties, enables healthcare providers to confidently incorporate it into treatment plans. This provides a natural alternative to conventional antiemetics and can enhance patient satisfaction.

In conclusion, this systematic review synthesized clinical trial evidence confirming the potential of ginger to alleviate symptoms of hyperemesis gravidarum. Ginger has consistently demonstrated efficacy in reducing NVP across a variety of studies, with minimal side effects. This is especially significant given the widespread use of herbal remedies among expectant women worldwide. The evidence supports the use of ginger, in various forms including tablets and cookies, as safe and effective for managing severe NVP.

Disclosure of conflict of interest

None.

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