

The clinical effectiveness of ginger compared to vitamin B6 in reducing hyperemesis gravidarum: Systematic review

Enggar Avilia Pragastiwi^{1,*}, Intan Arum Anjar Wati², Pahyuri Lubis³, Siti Nurul Fadhilah Sari⁴, Muftlillah⁵, Putri Listiani⁶

^{1,3,4,5} Faculty of Health Science, Universitas 'Aisyiyah Yogyakarta

² Pusat Kebijakan Pembiayaan dan Manajemen Asuransi Kesehatan, FKMKM UGM

¹ pragastiwienggar@gmail.com

* corresponding author



ARTICLE INFO

Article history

Received, 23 August 2023

Revised, 23 November 2023

Accepted, 25 May 2024

Keywords

Ginger;

Vitamin B6;

Hiperemesis Gravidarum;

ABSTRACT

Introduction: Hyperemesis gravidarum refers to an extreme condition of nausea and vomiting that occurs during pregnancy. Nausea and vomiting that harm the mother differ from morning sickness, commonly experienced in early trimester pregnant women. Approximately 14.8% of pregnancies experience symptoms of nausea and vomiting, with occurrence rates ranging from 60-80% among first-time mothers (primigravidas) and 40-60% among women who have had multiple pregnancies (multigravidas). These symptoms become more severe in one in a thousand pregnancies. **Purpose:** This study aimed to systematically review Ginger's effectiveness compared to vitamin B6 in reducing hyperemesis gravidarum. **Method:** This is a systematic review of three databases (PubMed, ScienceDirect, and Willey online library). The PRISMA-ScR protocol was employed in this research review, utilizing a Population, Intervention, Comparison, and Outcome (PICO) framework. The population is first-trimester pregnant women who experience Hyperemesis gravidarum using a completely original research article comparing Ginger and vitamin B6 in reducing hyperemesis gravidarum. **Results:** A significant statistical distinction was observed between the Ginger and the vitamin B6 group concerning the nausea score (mean difference 0.63, CI -0.10-1.35) and vomiting score (mean difference 0.42, CI -0.13, 0.98). **Conclusion:** Based on the research results, there was no significant difference in the effectiveness of giving Ginger compared to vitamin B6 in reducing hyperemesis gravidarum. However, the analysis showed that the average score of giving Ginger was lower than vitamin B6. The lower the nausea or vomiting score, the better the effect of the intervention. **Suggestion:** Health workers (doctors and midwives) can use Ginger as an alternative to reduce hyperemesis gravidarum during early pregnancy.

This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



1. Introduction

In the Indonesia Republic Minister of Health regulation, the world of midwifery must be connected to the use of health technology, which continues to develop and be developed according to the needs of health services. Inappropriate use of health technology, especially drugs, can cause the technology to malfunction when used (Budi G, 2022).

Hyperemesis gravidarum refers to an extreme condition of nausea and vomiting that occurs during pregnancy. Nausea and vomiting that harm the mother differ from morning sickness, commonly experienced in first-trimester pregnant women (Mares et al., 2022). As per the guidelines provided

by the World Health Organization (WHO) in 2016, in research (Matthews et al., 2015), Around 12.5% of pregnancies worldwide experience nausea and vomiting (hyperemesis gravidarum). Nausea and vomiting can disrupt normal fluid balance in kidney and liver tissues, leading to necrosis.

Based on data from the Indonesia Republic Minister of Health for 2020, The prevalence of nausea and vomiting among pregnant mothers accounted for 14.8% of all pregnancies. Nausea and vomiting are reported in approximately 60-80% of first-time pregnant individuals (primigravidas) and 40-60% of those who have been pregnant before (multigravidas) (Mardiyanti & Zuwariyah, 2019). These symptoms become more severe in one in a thousand pregnancies. The sensation of nausea and vomiting is triggered by elevated levels of estrogen and human Chorionic Gonadotropin (HCG) hormone (Boelig et al., 2016a). Derived from information in the Indonesian Demographic Health Survey (SDKI, 2021), roughly 50% to 80% of pregnant women encounter nausea and vomiting, known as Hyperemesis gravidarum. Additionally, about 5% of pregnant women necessitate treatment for fluid replacement (Suriati & Yusnidar, 2021).

Hyperemesis Gravidarum will disrupt the body's metabolism, which causes the birth of preterm babies with smaller weights (Mahmood et al., 2021). Hyperemesis gravidarum can be treated with pharmacology and non-pharmacology. According to (Elkins et al., 2022), pharmacological treatment includes administration of pyridoxine (vitamin B6), antiemetics, and corticosteroids. Non-pharmacologically, it can be through prevention and traditional medicine such as Ginger, peppermint leaves, lemon and others (O'Donnell et al., 2016). Ginger is mentioned in Surah Al Insan verse 17, namely, "In heaven they are given a glass (drink) mixed with ginger," and previous research carried out by (Ali et al., 2021). Demonstrated the impact of brewing ginger in alleviating vomiting and nausea among pregnant women during the first trimester.

Health Technology Assessment (HTA) is a systematic assessment of the effectiveness and/or impact of healthcare technologies, intending to offer policymakers relevant information regarding these technologies, thereby minimizing costs and preventing the use of questionable technology (Mph & Dr. Yuli Farianti, 2022). HTA can be utilized in various healthcare technologies, including diagnostic tests, pharmaceuticals, medical procedures, and medical, dental, and surgical devices. This scan specifically concentrates on the HTA procedures and policies employed in drug assessments (Cowling & Pan., 2016).

Several earlier literature analyses revealed that the usage of HTA criteria varied, despite the objects being Ginger and vitamin B6. Therefore, this study will summarize several previous studies regarding the criteria commonly used in HTA for ginger and vitamin B6.

This study aims to conduct a systematic review that discusses how effective HTA using ginger and vitamin B6 (Pyridoxine) reduces Hyperemesis gravidarum. Both are no different, can reduce nausea, relieve symptoms, effectively comparable to the value of ginger function with B6 function as long as the appropriate dose and the right time to take it, in the content of ginger there is vitamin C, vitamin B6, micronutrients, (magnesium, potassium) copper, fiber. Ginger is high in phytochemicals, polyphenol, gingerol, shogaol, paradol with the benefit of expanding blood circulation, relieving heartburn, reducing nausea, while B6 contains Pyridoxin, as a nutrient, reducing nausea, helping the production process, fighting infections, the nature of B6 is a vitamin, supplements do not need a doctor's prescription on sale freely, but there are effects of excess B6 damaging nerves, becoming neuropathy, improving mood. The research question discussed in this article is When compared to vitamin B6, how does ginger affect pregnant women with hyperemesis gravidarum? With this research, after knowing the commonly used criteria, it is hoped that it can provide information about what criteria are used in HTA.

2. Methods

In this research review, the PRISMA-ScR protocol is employed, which follows a PICO (Population, Intervention, Comparison, and Outcome) framework. The population is first-trimester pregnant women who involve articles related to hyperemesis gravidarum using original research articles related to comparing giving ginger and vitamin B6 in reducing hyperemesis gravidarum.

Table 1. PICO Framework

P (Population)	I (Intervention)	C (Comparison)	O (Outcome)
Pregnant Women Pregnancy Antenatal	Ginger	Vitamin B6 Pyridoxine	Hyperemesis Gravidarum Vomiting Nausea

2.1. Eligibility Criteria

The articles were identified based on the inclusion criteria, which included original research articles available in both Indonesian and English published from the beginning until 2023, articles containing the value of the efficacy of Ginger versus vitamin B6 in mitigating hyperemesis gravidarum, and the exclusion criteria were not getting the full text.

2.2. Information Source

The databases utilized include Pubmed, Science Direct, and Wiley Online Library to search for relevant articles in this study.

2.3. Search Strategy

The reviewers adopted the PRISMA-ScR checklist protocol, which consisted of 22 measurement items, 20 relevant publications, and 2 additional items as they conducted a systematic review. (Tricco et al., 2018). Search articles using keywords (ginger* OR gingerol* OR ginger extract*) AND (pyridoxine* OR Vitamin B6*) AND (pregnancy* OR first pregnancy trimester* OR early pregnancy*) AND (hyperemesis gravidarum* OR vomiting* OR nausea*)

2.4. Selection Process

The criteria used to include articles in this report were all studies comparing Ginger with vitamin B6 to hyperemesis gravidarum. This study aimed to examine and compare the effects of Ginger with vitamin B6, and participants were randomly assigned to different trials; the main result was an increase in hyperemesis gravidarum. Articles are excluded if they consist of systematic reviews, observational studies, or in vitro experiments. Insufficient or inadequate data and research that involve comparisons with other interventions such as placebo, ondansetron, and acupressure are also removed. To assess the suitability of the entire article, two separate reviewers in the early stages independently examined the title and abstract. Then look at the differences of opinion between the two reviewers, and can be resolved by discussion. All authors incorporated articles that exhibited sound methodological quality in their reviews.

2.5. Data Collection Process and Data Item

The search process conducted across the 3 databases yielded 356 articles. After screening, it was found that 197 of these duplicate articles had been deleted, and up to 159 were retrieved. 33 articles were lost because many were screened or excluded due to non-English, were reviews that deviated from the title, or did not meet the inclusion criteria. The remaining articles are retrieved according to their relevance and are composed in English. They include the original article as well as a critical evaluation. Four articles are specifically focused on data extraction analysis of charting data. The research results excavated are subsequently assessed through "critical appraisal."

2.6. Synthesis Methods

The reviewers employ Zotero as a software for managing references, which aids in selecting articles by conducting checks for duplicates, selecting based on titles and abstracts, and facilitating access to full-text content. A visual representation of a Flowchart for Systematic Review and Meta-Analysis (PRISMA) illustrates the count of identified publications and the steps employed to filter them (Tricco et al., 2018).

3. Results

3.1. Study Selection

The procedures for searching available literature and selecting studies are depicted in the PRISMA diagram (Gaur et al., 2022; Hu et al., 2022), which includes the methods of all the research being sought, screened, rejected, and included in the review. Initially, 356 studies were retrieved from

various databases, and after excluding 197 duplicate studies, the remaining studies were considered. Out of the 33 studies initially identified based on their titles, four studies that fulfilled the inclusion criteria were selected for a systematic review.

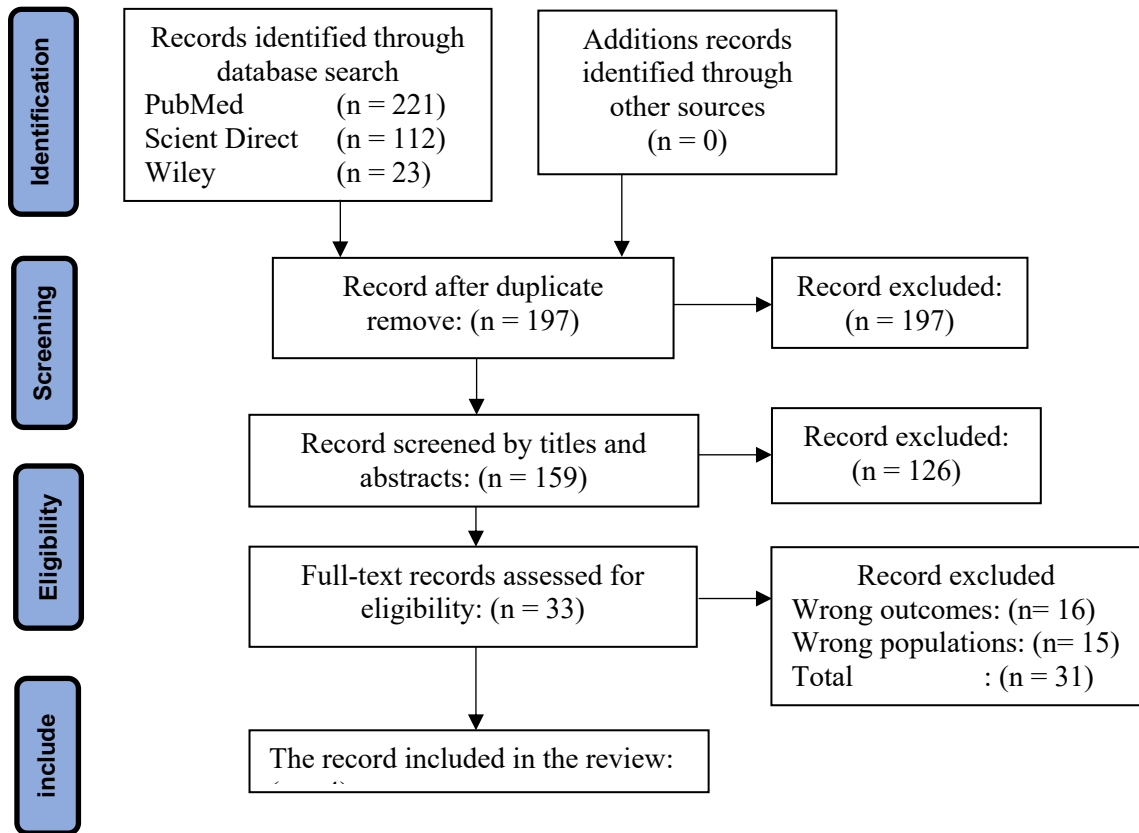


Fig. 1. PRISMA-ScR Flow chart

3.2. Research Characteristics

Based on the 4 selected articles, enter the article's main characteristics: title, author, country, method, intervention and results.

Table 2. The Main Characteristics of the articles included

Title, Author, Year	Country	Research Type	Number of intervention participants (Ginger)/control (Vitamin B6)	Intervention/control protocol	Results (ginger/ vitamin B6)	
					Nausea score (mean ± SD)	Vomit score (mean ± SD)
					Post score 4 days	Post score 4 days
Comparing Ginger and vitamin B6 for the treatment of nausea and vomiting in pregnancy: a randomized controlled trial (Ensiyeh & Sakineh, 2009)	Iran	RCT	35/35	Over a span of four days, the daily intake consisted of 1000 mg ginger capsules and 40 mg vitamin B6.	Ginger: 2.2 ± 1.9 Vitamin B6: 0.9 ± 1.7	Ginger: 0.6 ± 0.7 Vitamin B6: 0.5 ± 1.1
Comparing the Effectiveness of Vitamin B6 and Ginger in Treatment of Pregnancy-Induced Nausea and Vomiting (Javadi et al., 2013)	Iran	RCT	47/ 48	Over a span of four days, the daily intake consisted of 1000 mg ginger capsules and 80 mg vitamin B6.	Ginger: 6.28 ± 1.63 Vitamin B6: 5.98 ± 1.45	Ginger: 8.32 ± 2.19 Vitamin B6: 7.77 ± 1.8
Comparison of the Effectiveness of Ginger and Vitamin B6 for Treatment of Nausea and Vomiting in Early Pregnancy: A Randomized Double-Blind Controlled Trial (Chittumma et al., 2007)	Thailand	RCT	61/ 62	Over a duration of four days, consume ginger powder capsules with a dosage of 1950 mg and vitamin B6 capsules with a dosage of 75 mg.	Ginger: 4.7 ± 1.8 Vitamin B6: 3.5 ± 1.5	Ginger: 4.7 ± 1.8 Vitamin B6: 3.5 ± 1.5
Comparison of Ginger with vitamin B6 in relieving nausea and vomiting during pregnancy (Firouzbakht et al., 2014)	Iran	RCT	28/ 35	Over a span of four days, the daily consumption included 1000 mg of ginger capsules and 75 mg of vitamin B6.	Ginger: 0.4 ± 0.8 Vitamin B6: 0.54 ± 0.88	Ginger: 0.47 ± 0.89 Vitamin B6: 0.5 ± 0.88

3.3. Nausea Final Score of Day 4

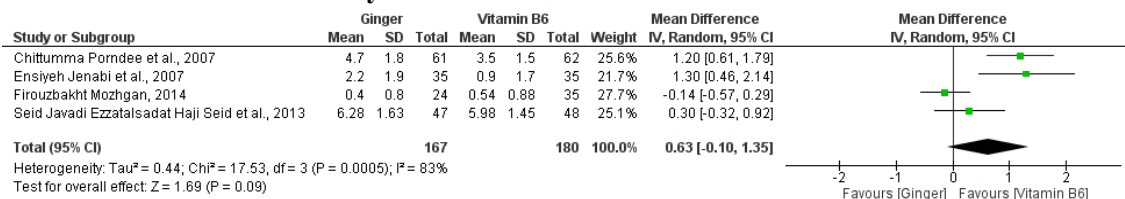


Fig. 2. Random effect score of nausea

Based on the metaanalysis results, Ginger and vitamin B6 statistically did not have a different effect on relieving nausea. The dose used is ginger 40- 75 mh / day is better taken before meals and can be brewed with tea, milk or as a supplement. While b6 is made in doses of 10-15 mg / day. (mean difference 0.63 (CI -0,10-1,35)).

Based on the meta-analysis results of the four articles, clinically Ginger and vitamin B6 Chittumma et al., 2007 (n = 123) and Ensiyeh & Sakineh, 2009 (n = 70) indicated a higher rise in nausea scores among women who used Ginger compared to those who took vitamin B6—the higher the nausea score, the lower the effect of the intervention.

3.4. Vomiting Final Score Day 4

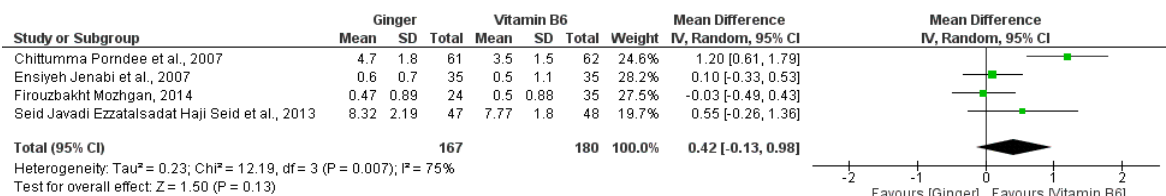


Fig. 3. Random effect score of vomiting

Based on the meta-analysis results, statistically, Ginger and vitamin B6 had no different effect on relieving nausea (mean difference 0.42 (CI -0.13, 0.98) was greater in the Ginger group.

Based on the metaanalysis results of the four articles, clinically Ginger and vitamin B6, Chittumma et al., 2007 (n = 123) and Ensiyeh & Sakineh, 2009 (n = 70) reported a greater increase in vomiting score among women who consumed Ginger as opposed to vitamin B6. The higher the vomiting score, the lower the effect of the intervention.

3.5. Change in Overall Nausea Vomiting Score

The meta-analysis results above regarding comparing Ginger and vitamin B6 show that Ginger exhibits lower effectiveness than vitamin B6 in reducing hyperemesis gravidarum.

4. Discussion

This study compared Ginger with vitamin B6; there was no significant difference in the efficacy between administering Ginger and vitamin B6 for reducing hyperemesis gravidarum. The meta-analysis results showed that the average score of Ginger administration was lower than vitamin B6; the lower the nausea and vomiting score, the better the effect of the intervention given.

According to this study, 4 days of safe treatment with Ginger and vitamin B6 per day improves signs of Hyperemesis in pregnant women, doses ranging from 1000 – 1500 mg of Ginger and 40 – 75 mg of vitamin B6 are used during pregnancy (Chittumma et al., 2007; Ensiyeh & Sakineh, 2009; Firouzbakht et al., 2014; Javadi et al., 2013). Ginger's effectiveness in relieving symptoms of nausea during pregnancy is not much different from vitamin B6, which has been confirmed by recent studies (Gaur et al., 2022). This finding aligns with previous research by (Chittumma et al., 2007; Dyna & Febriani, 2020; Firouzbakht et al., 2014).

Ginger's efficacy in alleviating nausea and vomiting symptoms during pregnancy is comparable from that of vitamin B6 (Jamigorn & Phupong, 2007; Pakniat et al., 2018). In both treatments, the

use of Ginger and vitamin B6 significantly reduced nausea and vomiting, The intervention effect of the clinical trial was enhanced by increasing the dose of ginger, as a policy for further studies.

Criteria in the Health technology assessment, Ginger as a herbal plant and can provide the effect of speed of digestive countermeasures, there needs to be a gap in the review of this topic, the economy of the community can be cheap, easily obtained around the community, allowing easy to obtain as first prevention, first aid, dosage, the impact of drugs on the body's response control, and as an effective treatment of traditional medicine. Health Technology Assessment was tested and assessed with effectiveness in hyperemesis or in emesis with different doses for ginger and B6, need to pay attention to the side effects of ginger on kidney function, liver and check Hemoglobin.

HTA for ginger benefits more and works effectively, cost or economic elements / cost effective, can improve the quality of health services, safe services, efficient quality, limited resources and more safety, reasonable efficacy, there is legality and ethical value, safe higher usability. Can change the behavior of patients, doctors, midwives in providing care, as a reallocation of national health resources, affecting technological adaptation, strengthening new policies in risk, economy, insurance risk and increasing productivity that is safe more effective lower than B6. Being an alternative choice in reducing nausea and vomiting but there was no difference between the two groups (Harmel & Höfelmann, 2022). (Javadi et al., 2013) they assessed that there was no significant difference between the Ginger and vitamin B6 groups in alleviating the symptoms of nausea and vomiting during pregnancy. The results are consistent with research by (ElMazoudy & Attia, 2018; Hu et al., 2022; Rofi'ah et al., 2020) that there is no significant difference in the efficacy of Ginger and vitamin B6 for alleviating symptoms of hyperemesis gravidarum.

Research results (Boelig et al., 2016b; Lu et al., 2021; Suriati & Yusnidar, 2021) said that vitamin B6 demonstrated greater efficacy in reducing nausea in early pregnancy compared to Ginger. Our observations found no significant difference in giving Ginger and vitamin B6 to reduce hyperemesis gravidarum after the intervention showed that both Ginger and vitamin B6 exhibited comparable effectiveness in reducing the average occurrence of nausea and vomiting during pregnancy (Pakniat et al., 2018) Ginger dose 40- 75 mg.

B6 10-15 mg/day 3 times a day. Between ginger and B6 is the same, in the statistical results there is a statistical difference and observation of the use of, can reduce the nausea score and can not occur a significant difference, both can be as prevention and traditional medicine for ginger.

5. Conclusion

Based on the research results, there was no significant difference in the efficacy of administering Ginger compared to vitamin B6 in lowering hyperemesis gravidarum. However, the analysis showed that the average score of giving Ginger was lower than that of vitamin B6. The lower the nausea or vomiting score, the better the effect of the intervention. Ginger is added to milk, tea and candy supplements, paying attention to the right time of administration, paying attention to the effectiveness of administration before meals, inner packaging and paying attention to the types of ginger including white, red, emprit, black which are predicted to have different content.

There is no significant difference between Ginger and vitamin B6. The analysis score results of Ginger is lower, giving Ginger is better for Hyperemesis but not significant. Health workers (doctors and midwives) can use Ginger as an alternative to reduce hyperemesis gravidarum during early pregnancy.

Acknowledgment

The researcher extends their gratitude to the Midwifery Study Program, Master Program, Faculty of Health Sciences, University of 'Aisyiyah Yogyakarta, external lecturers from Gajah Mada University, and all parties who helped complete this article. No conflicts of interest were present during the preparation of this article.

References

- Ali, H., Ishak, & Hiola. (2021). Effectiveness Of Giving Ginger Candy To Nausea And Vomiting In Pregnant Women Hyperemesis Gravidarum. *Madu Jurnal Kesehatan*, 10(1), 17–23.
- Boelig, Barton, Saccone, Kelly, Edwards, & Berghella. (2016a). Interventions for treating hyperemesis gravidarum. *Cochrane Database of Systematic Reviews*, 16(5). <https://doi.org/10.1002/14651858.CD010607.pub2>
- Boelig, R. C., Barton, S. J., Saccone, G., Kelly, A. J., Edwards, S. J., & Berghella, V. (2016b). Interventions for treating hyperemesis gravidarum. *Cochrane Database of Systematic Reviews*, 2016(5). <https://doi.org/10.1002/14651858.CD010607.pub2>
- Chittumma, Kaewkiattikun, & Wiriyasiriwach. (2007). Comparison Of The Effectiveness Of Ginger And Vitamin B6 For Treatment Of Nausea And Vomiting In Early Pregnancy: A Randomized Double-Blind Controlled Trial. *In J Med Assoc Thai*, 90(1). <http://www.medassocthai.org/Journal>
- Cowling, T., & Pan., S. (2016). *Single Drug Technology Assessment Processes Across Health Technology Assessment Organizations*.
- Dyna, & Febriani. (2020). Giving Ginger Oil Aromatherapy Towards Nauseous Vomit Frequency on Pregnant Women Morning Sickness. *Nursing Journal of Health Science Kendal*, 12(1), 41–46.
- Elkins, Oxentenko, & Nguyen. (2022). Hyperemesis Gravidarum And Nutritional Support. *The American Journal Of Gastroenterology*, 117(10), 2–9.
- ElMazoudy, R. H., & Attia, A. A. (2018). Ginger causes subfertility and abortifacient in mice by targeting both estrous cycle and blastocyst implantation without teratogenesis. *Phytomedicine*, 50, 300–308. <https://doi.org/10.1016/j.phymed.2018.01.021>
- Ensiyeh, & Sakineh. (2009). Comparing Ginger And Vitamin B6 For The Treatment Of Nausea And Vomiting In Pregnancy: A Randomised Controlled Trial. *Midwifery*, 25(6), 649–653. <https://doi.org/10.1016/J.Midw.2007.10.013>
- Firouzbakht, Omidvar, Nikpour, & Jamali. (2014). Comparison Of Ginger With Vitamin B6 In Relieving Nausea And Vomiting During Pregnancy. *An International Quarterly Journal Of Research In Ayurveda*, 35(3), 289.
- Gaur, Mudgal, Kalyani, Athira, Kaur, Rulaniya, & Khan. (2022). Ginger Vs Vitamin B6 For Treating Nausea And Vomiting During Pregnancy: A Systematic Review And Metaanalysis. *Journal Of Safog*, 14(2), 210–217. <https://doi.org/10.5005/Jp-Journals-10006-2040>
- Harmel, B., & Höfelmann, D. A. (2022). Mental distress and demographic, behavioral, obstetric characteristics, and health condition in pregnant women. *Salud Mental*, 45(1), 11–18. <https://doi.org/10.17711/SM.0185-3325.2022.003>
- Hu, Amoah, Zhang, Fu, Qiu, Cao, Sun, Chen, Liu, & Lyu. (2022). Effect Of Ginger In The Treatment Of Nausea And Vomiting Compared With Vitamin B6 And Placebo During Pregnancy: A Metaanalysis. *In Journal Of Maternal-Fetal And Neonatal Medicine*, 35(1), 187–196. <https://doi.org/10.1080/14767058.2020.1712714>
- Jamigorn, M., & Phupong, V. (2007). Acupressure and vitamin B6 to relieve nausea and vomiting in pregnancy: A randomized study. *Archives of Gynecology and Obstetrics*, 276(3), 245–249. <https://doi.org/10.1007/s00404-007-0336-2>
- Javadi, H. S., Salehi, & Mashrabi. (2013). Comparing The Effectiveness Of Vitamin B6 And Ginger In Treatment Of Pregnancy-Induced Nausea And Vomiting. *Obstetrics And Gynecology International*, 14(1), 1–14. <https://doi.org/10.1155/2013/927834>
-

- Lu, H., Zheng, C., Zhong, Y., Cheng, L., & Zhou, Y. (2021). Effectiveness of Acupuncture in the Treatment of Hyperemesis Gravidarum: A Systematic Review and Meta-Analysis. *Evidence-Based Complementary and Alternative Medicine*, 2021. <https://doi.org/10.1155/2021/2731446>
- Mahmood, Shah, Z., Rasool, Waqar, Zia-UI-Miraj, Maken, H., Gohar, & Rauf. (2021). Effect Of Vitamin B6 And Acupressure On Vomiting Symptoms In Pregnant Women With Hyperemesis Gravidarum. *American Journal Of Biomedical And Life Sciences*, 9(1), 29. <https://doi.org/10.11648/J.Ajbls.20210901.14>
- Mardiyanti, & Zuwariyah. (2019). The Effectiveness of Jsj (Jin Shin Jyutsu) in Addressing Emesis of Gravidarum in Pregnant Women At Pmb Ika Mardiyanti Sidoarjo. *Nurse and Health: Jurnal Keperawatan*, 8(1), 36–42. <https://doi.org/10.36720/nhjk.v8i1.57>
- Mares, Morrow, Shumway, Zapata, Forstein, & Brooks. (2022). Assessment Of Management Approaches For Hyperemesis Gravidarum And Nausea And Vomiting Of Pregnancy: A Retrospective Questionnaire Analysis. *BMC Pregnancy and Childbirth Volume*, 22(1).
- Matthews, A., Haas, D. M., O’Mathúna, D. P., & Dowswell, T. (2015). Interventions for nausea and vomiting in early pregnancy. *Cochrane Database of Systematic Reviews*, 2015(9). <https://doi.org/10.1002/14651858.CD007575.pub4>
- Mph, P. D. D. B. W. S. O. (K), & Dr. Yuli Farianti, M. E. (2022). *General Guideline For Health Technology Assessment In Indonesia. General Guideline For Health Technology Assessment In Indonesia*.
- O’Donnell, A., McParlin, C., Robson, S. C., Beyer, F., Moloney, E., Bryant, A., Bradley, J., Muirhead, C., Nelson-Piercy, C., Newbury-Birch, D., Norman, J., Simpson, E., Swallow, B., Yates, L., & Vale, L. (2016). Treatments for hyperemesis gravidarum and nausea and vomiting in pregnancy: A systematic review and economic assessment. *Health Technology Assessment*, 20(74), vii–268. <https://doi.org/10.3310/HTA20740>
- Pakniat, Memarzadeh, Azh, & Ranjkesh. (2018). Comparison Of The Effect Of Chamomile, Ginger And Vitamin B6 On Treatment Of Nausea And Vomiting In Pregnancy: A Randomized Clinical Trial. *The Iranian Journal Of Obstetrics, Gynecology And Infertility.*, 21(8), 47–54. <https://doi.org/10.22038/Ijogi.2018.11969>
- Rofi’ah, Handayani, & Rahmawati. (2020). *The Effectiveness of Ginger and Lemon Grass Consumption in Overcoming Nausea and Vomit*. 7.
- Suriati, & Yusnidar. (2021). Causes Of Hyperemesis Gravidarum. *Jurnal Kebidanan*, 11(1), 76–81.
- Tricco, Lillie, Zarin, O’Brien, & Colquhoun. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, 169(7), 467–473.