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Safety Evaluation of Ginger in Pregnancy and Lactation - A Systematic Review

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ABSTRACT

BACKGROUND AND OBJECTIVES: Ginger, *Zingiber officinale* Roscoe have been increasingly used throughout the world as a therapeutic agent for centuries. Ginger is used non pharmacologically in pregnancy induced nausea and vomiting and also among lactating women to increase milk volume for decades, but the safety of that is still in question and thereby the cause for concern. The primary objective of this review is to provide the cumulative evidence to evaluate the safety of ginger in pregnant and lactating women. **METHODS:** All the publications that were available, that may be original or review articles that were published during a period from 1999 to 2019 available in English language. The information which are available in books, magazines, in vivo studies and unavailable full texts papers were excluded. **RESULTS AND DISCUSSION:** In this review, from the studies included, it was evident that these studies warrants that ginger is as efficacious as the pharmacologic therapy with mild symptoms, except in some studies which documented major effects like spontaneous abortions and stillbirth. **CONCLUSION:** For the most part, its seen in the study included that when given 250 mg doses of ginger four times daily had shown no side effects and any congenital abnormalities and thereby it is safer to assume that at this dose and this frequency, ginger is safer for consumption in pregnant women and more studies are needed for its use among the lactating women.

INTRODUCTION

Nausea and vomiting of pregnancy is a very common condition. Although nausea and vomiting of pregnancy often is called "morning sickness," it can occur at any time of the day. Nausea and vomiting of pregnancy usually starts before 9 weeks of pregnancy. For most women, it goes away by the second trimester (14 weeks of pregnancy). For some women, it lasts for several weeks or months. For a few women, it lasts throughout the entire pregnancy. ***Hyperemesis gravidarum*** is the most severe form of nausea and vomiting of pregnancy. It occurs in up to 3% of pregnancies. This condition may be diagnosed when a woman has lost 5% of her pre pregnancy weight and has other problems related to ***dehydration*** (loss of body fluids). Women with hyperemesis gravidarum need treatment to stop their vomiting and restore body fluids.[1] Pharmacological approaches for the treatment of NVP have been based on the pathophysiology of nausea and vomiting and on treatments found to be successful for non-pregnant subjects as well. Some pregnant women prefer natural, non-pharmacological therapies, such as lifestyle and nutritional habit changes, pyridoxine and ginger. Herbal medication for NVP is common.[2]

According to WHO, global report on traditional and complementary medicine 2019, WHO's 13th General Programme of Work (GPW13) came into effect this year for 2019–2023. As a strategic priority, GPW13 sets an overarching goal of reaching 3 billion more people, to move towards Sustainable Development Goal 3 (SDG 3) – ensuring healthy lives and promoting well-being for all at all ages – by achieving universal health coverage (UHC), addressing health emergencies and promoting healthier populations. Traditional and complementary medicine (T&CM) can make a significant contribution to the goal of UHC by being included in the provision of essential health services. T&CM is used by at least 80% of the Member States across all WHO regions, with more than 90% of Member States in the Eastern Mediterranean, South-East Asia and Western Pacific regions reporting use of T&CM. Globally, the landscape for T&CM has been improving consistently. And the most common herbal remedies used by the women while pregnancy is ginger.

Ginger, Zingiber officinale Roscoe have been increasingly used throughout the world as a therapeutic agent for centuries.

Whereas ginger consumption for nausea and vomiting in pregnancy is authorized in several countries (France, Belgium) or forbidden in others (Finland, Russia).[3]

Many food supplements with ginger powder or ginger extracts are used to decrease symptoms of nausea and vomiting associated with pregnancy. This effect is supported by a European claim which was mentioned in one systematic review[3] that it *"*Helps to support the digestion/contributes to the normal function of intestinal tract/contributes to physical well-being/contributes to the normal functioning of the stomach in case of early pregnancy*"* provided the product contains the equivalent of 0.5 to 2 g of root per day.

According to WHO, Breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of infants; it is also an integral part of the reproductive process with important implications for the health of mothers. Review of evidence has shown that, on a population basis, exclusive breastfeeding for 6 months is the optimal way of feeding infants. Thereafter infants should receive complementary foods with continued breastfeeding up to 2 years of age or beyond.

However, many women perceive that their milk supply is too low, and there may be a clinical reason that milk production or release is inadequate. Insufficient milk supply is one of the most commonly cited reasons for early cessation or decreased exclusivity in women who have initiated breastfeeding. [4]

Of the different types of research reported, eight were RCTs of various medications. Three trials, all conducted overseas, focused on the drug domperidone. Opinion is mixed on domperidone's use in lactation because of reported risk of cardiac arrhythmias in trials of the drug for gastrointestinal disorders. It is not approved for use in the U.S. any purpose, including lactation. The FDA issued a domperidone import alert in 2004 and updated it in 2012, and also issued a public safety warning against the drug's use for lactation.[5] Besides conventional medicines, herbal remedies have been used as a mean to increase the breast milk supply in postpartum women. In Thailand, ginger is commonly known to stimulate milk supply and is a popular natural galactagogue among breastfeeding women. However, there has never been evidence to support the effectiveness of ginger in increasing the breast milk volume.[6] so is the safety of the ginger in lactating women.

The complementary and traditional medicines use has been increased tremendously in the recent years. And especially the efficacy of the ginger in treating various conditions pertaining to pregnancy and lactation has been hypothesised and various studies have been conducted and also the comparison of its effectiveness over the conventional medicines had

been carried out with favourable outcomes. In one meta analysis and SR of ginger in pregnancy reported that Based on evidence from this SR, ginger could be considered a harmless and possibly effective alternative option for women suffering from the symptoms of NVP.[7]

But the safety of these is still in question, as there hadn't been any studies conducted with a primary focus being the safety of ginger in the pregnancy and lactation. And the heterogeneity of the results in the studies and also the concern of the safety being the foremost reasons of the apprehension and inhibitions regarding the use of it in the pregnancy and lactation.

So the purpose of our study is to review and evaluate the safety of ginger in pregnancy and lactation.

LITERATURE REVIEW:

Karen E. Willets *et al.,* Effect of a ginger extract on pregnancy-induced nausea:

A randomised controlled trial involving 120 women who had experienced morning sickness daily for at least a week and had had no relief of symptoms through dietary changes was conducted from March 1999–November 1999. Patients were divided into 2 groups by randomization. For both the ginger extract and placebo groups, there was a noticeable reduction in overall nausea experience score from baseline to day 1, which then appears to remain consistent through to day 4. The results were showed that there was no significant difference between ginger extract and placebo groups for any of the vomiting symptoms. For retching symptoms, the ginger extract group was shown to have significantly lower symptom scores than the placebo group for the first 2 days only. Women who were exposed to ginger group, there were two spontaneous abortions, one stillborn, one neonatal death and one lost to follow-up or who declined to give consent to follow-up.

Subhash Chandra Biswas *et al.,* A Single-masked, Randomized, Controlled Trial of Ginger Extract in the Treatment of Nausea and Vomiting of Pregnancy was conducted which involved 78 women experiencing morning sickness between 6 to 16 weeks of pregnancy without having received any treatment earlier for the same was conducted from November, 2004 to April, 2005. For each individual subject the study consisted of 3 weeks of active treatment with follow up visit at the end of first and second week. Between group comparison

of the nausea and vomiting parameters, did not reveal any difference at any time point. Thus the groups were comparable at baseline and remained so at study end and at both the intervening follow up visit. Only 1 subject out of the 34 [0.68%] evaluated from Group A, complained of two different adverse events. This was body ache and loose stools, occurring at different times. Two subjects out of the 29 in group B [0.585] suffered from hyperacidity. The duration, in all three instances, was short (<2 days), the intensity moderate, and the outcome satisfactory. None of these events was considered to be related to study drug by the investigator concerned.

Densak Pongrojpaw *et al.,* A Randomized Comparison of Ginger and Dimenhydrinatein the Treatment of Nausea and Vomiting in Pregnancy was conducted from between January 2005 December 2005 involving 170 Pregnant women with nausea and vomiting and were eligible for the trial if they were less than 16 weeks of gestation. The results point out that frequency of vomiting times in day 1-7 of the treatment was decreased in both groups. After day 3-7 post treatment, the daily mean vomiting times in both groups were not statistically different ($p > 0.05$). The occurrence of drowsiness in the ginger group and dimenhydrinate group were 5/85 (5.88%) versus 66/85 (77.64%) ($p < 0.01$). The occurrence of heartburn was 13/85 (15.2%) versus 9/85 (10.58%) ($p = 0.403$), respectively. No other adverse effect observed in both groups during the one-week follow up.

Giti Ozgoli *et al.,* Effects of Ginger Capsules on Pregnancy Nausea and Vomiting was conducted with the subjects included 67 pregnant women who complained of nausea and vomiting under 20 weeks gestational age, from June and July 2005. It concluded that nausea intensity improved significantly in 84% of ginger users versus 56% of the women in the control group (Mann- Whitney test, p _ 0.05).

None of the participants reported any complications during the treatment period.

Zahra Basirat *et al.,* The Effect of Ginger Biscuit on Nausea and Vomiting in Early Pregnancy in Babol town, Northern Iran performed a double randomized controlled trial among 65 women with NVP at or before 7th and 17 weeks of gestation was conducted during 2005- 2006. And it showed that the average change in nausea scores (baseline minus average post-therapy nausea scores of day 1-4 for all subjects) in the ginger group was significantly greater. (P=0.01) than that in placebo group. Regarding the side effects, there was no complaint in placebo group whereas in ginger group one patient (3.12%) complained from

dizziness and 1 (3.12%) from heartburn due to ginger biscuit, which were mild. No abnormal pregnancy and delivery outcome occurred and no infants had any congenital abnormalities recognized and all were discharged in good condition.

Jenabi ensiyeh *et al.,* Comparing ginger and vitamin B6 for the treatment of nausea and vomiting in pregnancy: a randomised controlled trial, involving 70 Pregnant women with nausea, who first attended the antenatal clinic at or before 17 weeks gestation was conducted over a 3 -month period 5 April and 5 July 2006. The trial concluded that the median change in nausea score (baseline minus average post-therapy nausea score) in the ginger group was significantly greater (p ¼ 0.024) than that in the vitamin B6 group. (1WEEK FOLLOW UP VISIT). There were two spontaneous abortions in the ginger group and one in the vitamin B6 group. No babies had any congenital anomalies and all were discharged in good condition.

James S. McLay *et al.,* Pregnancy, prescription medicines and the potential risk of herb-drug interactions: a cross-sectional survey was conducted with the data assessing the use of CAM collected from women attending for their mid-trimester (18–21 weeks) scan (n = 332) and women, within the first 24 h following a live birth, admitted to the postnatal unit (n = 557) at the Royal Aberdeen Maternity Hospital, North-East Scotland were combined from March-August 2012. The survey concluded that of the 34 potential interactions, almost all were rated as moderate (93.9%), one as a potentially major (ginger and nifedipine). As it significantly inhibits platelet aggregation, synergetic effects may lead to potential cardiovascular and cerebrovascular complications.

Wasinee Tianthong *et al.,* A randomized, double-blind, placebo-controlled trial on the efficacy of ginger in the prevention of abdominal distention in post cesarean section patients involved 178 post cesarean section women aged 18 to 40 years within 24 hours postpartum was conducted between June 2016 and June 2017. The incidence of postoperative abdominal distention was not different between the ginger and placebo groups (20.2% vs 29.2%, p = 0.328). The severity of abdominal distention on the first – third day after operation was not different between groups, but on the fourth day after operation, the severity of abdominal distention was significantly lower in the ginger group than the placebo group (median visual analogue scale 10 vs 20, p = 0.036). The efficacy to relieve abdominal distention was also superior in the ginger group; more women in the ginger group felt that the drug can improve their symptom when compared to the placebo group (91% vs 65.2%, p < 0.001). There were constipation among 13 patients and heartburn in 6 patients and nausea and vomiting in 2

patients and diarrhea in 6 patients among ginger treated group patients. And 17 patients had constipation, 2 patients had nausea and vomiting and 2 patients had heartburn and 3 patients had diarrhea among placebo group.

Panwara Paritakul *et al.,* The Effect of Ginger on Breast Milk Volume in the Early Postpartum Period in Thailand conducted a Randomized, Double-Blind Controlled Trial involving 68 women and 34 were randomly assigned to each study group. Participants were randomized to receive either 1000mg/day of dried ginger capsule orally (ginger group) or placebo (placebo group. One capsule (500mg) twice daily for 7 days postpartum, with the first dose, started within 2 hours after her delivery. Healthy pregnant women aged 18 years and above who deliver a term baby (‡37 weeks gestation) at our hospital and aim to exclusively breastfeed her baby for at least 6 months were conducted from August 2015–April 2016. The nursing mother in the ginger group has higher milk volume (191.0 – 71.2 mL) than the placebo group (135.0 – 61.5 mL). The mean serum prolactin levels were similar in both groups (321.5 – 131.8 in the ginger group, and 331.4 – 100.7 in the placebo group, p = 0.74). For the ginger group, four participants were excluded (three withdrew from the study, and one developed postpartum endometritis and sepsis. (ON DAY 3 ASSESSMENT).

OBJECTIVES:

PRIMARY OBJECTIVES:

- To evaluate the safety of ginger and turmeric in pregnant and lactating women.

SECONDARY OBJECTIVES:

- To identify the uses and side effects of ginger and turmeric.

- Drug interactions of ginger and turmeric with concomitant drugs while being taken for a particular conditions in pregnant and lactating women.

PLAN OF WORK:

PHASE 1

- Literature survey to identify the background information and for the rationale of this study

- Preparation of study protocol

PHASE 2:

- Collection of articles.
- Screening of the articles for duplication

PHASE 3:

- Analysis of data

METHODOLOGY:

STUDY TYPE:

Systematic review

STUDY SITE:

The publications that were available for free in the electronic database.

STUDY DURATION:

The study was conducted for a period of 2 months from November to December 2019.

STUDY CRITERIA:

INCLUSION CRITERIA:

- All the publications that were available, that may be original or review articles.
- Articles that were published during a period from 1999 to 2019.
- Articles that were available in the English language.

EXCLUSION CRITERIA:

- Informations which are available in books, magazines, etc.
- *In vivo* studies.

- Study with unrelated duplicated data.
- Unavailable full texts or abstract-only papers as preceding papers.

SEARCH STRATEGY:

Literature searches were conducted from the period 1999-2019 from the computerized databases like Pubmed PMC free articles, Science direct, BMC complementary and alternative medicine articles accessed via science direct, From the journal of alternative and complementary medicine articles, From Oman medical journal articles accessed via the Google scholar using the keywords on the search string like Ginger, and Pregnancy, nausea and vomiting OR morning sickness and Randomized clinical trials OR Single blinded OR Double blinded trials, Ginger and Lactation or Breast milk. Additional articles were searched using the reference lists of the primarily searched articles using electronic database.

RESULTS:

STUDY CHARACTERISTICS:

The study included articles which were published between 1999- 2019. The characteristics of those studies are presented in table 1.7 studies out of 8 being the randomized controlled trials of ginger in the pregnancy and 1 is the cross sectional survey of herbal drugs use in pregnancy and potential drug interactions and one randomized controlled trial of ginger in lactation. The study condition including the dose or the amount of the ginger used as a intervention in the study was described in table 1. The course of pregnancy when the ginger was administered to the pregnant women being less than 20 weeks of gestation and even less than 16 weeks of gestation in other study and the treatment period consists of the least 3 days in one study and 3 weeks of treatment being the longest period of the treatment in other study.

ADVERSE EFFECTS AND SIDE EFFECTS:

The major adverse effect in the included studies were the two spontaneous abortions, one stillbirth and one neonatal death in one study in which the amount of ginger administered was 125 mg of ginger extract which is equivalent to 1.5 g of dried ginger of 4 days treatment. And two spontaneous abortions in another study in which 1 g of ginger was administered for a period of 4 days. The minor side effects were the heartburn being the common and dizziness,

constipation, diarrhea observed in the other 4 studies and in one study where the 250 mg of ginger root powder in a capsule for four times daily were administered for 4 days and this study concluded that there were no complications or side effects observed.

DRUG INTERACTIONS:

One study included was a cross sectional survey of herbal drugs use in the early pregnancy or immediate postpartum and it concluded that there were 34 potential herbal drug interactions. Of the 34 potential interactions, almost all were rated as moderate (93.9%), one as a potentially major between the ginger and nifedipine. And it is implicated that this ginger-drug interaction significantly inhibits platelet aggregation, synergetic effects, which may lead to potential cardiovascular and cerebrovascular complications. And a study conducted [8] regarding the Synergistic Effect of Ginger and Nifedipine in Hypertensive Patients and Normal Volunteers showed that a combination of 1 g ginger with 10 mg nifedipine would be valuable in cardiovascular and cerebrovascular complication due to platelet aggregation. However further confirmatory clinical studies are required especially among the pregnant women pertaining this antiplatelet aggregation effects and the theoretically implicated potential complications.

TABLE No. 1:

TOPIC	STUDY DESIGN	STUDY PERIOD	COURSE OF PREGNANCY	EXCLUSION CRITERIA	STUDY CONDITION	ENDPOINT	SIDE EFFECTS & SAFETY ISSUES.
1	Double-blind randomised placebo-controlled trial.	March 1999– Novembe r 1999.	120 women less than 20 weeks pregnant, who had experienced morning sickness daily for at least a week and had had no relief of symptoms through dietary changes.	Hospitalisation for dehydration during the current pregnancy, significant medical problems (hypertension, epilepsy or diabetes) and known allergy to ginger.	Random allocation of 125 mg ginger extract equivalent to 1.5 g of dried ginger or placebo given four times per day for 4 days.	For both the ginger extract and placebo groups, there was a noticeable reduction in overall nausea experience score from baseline to day 1, which then appears to remain consistent through to day 4. There was no significant difference between ginger extract and placebo groups for any of the vomiting symptoms. For retching symptoms, the ginger extract group was shown to have significantly lower symptom scores than the placebo group for the first 2 days only.	Women who were exposed to ginger there were two spontaneous abortions, one stillborn, one neonatal death and one lost to follow-up or who declined to give consent to follow-up.

2	Single blind, prospective, randomized, controlled trial	November 2004 to April, 2005.	Morning sickness between 6 to 16 weeks of pregnancy without having received any treatment earlier for the same.	Had multiple gestation, gestational trophoblastic disease, hyperemesis gravidarum, ovarian cyst, gastroesophageal reflux disease or other forms of acid peptic disorders, chronic or serious diseases of major organs if the containing food, spices, or beverages, or taking medication other than those permitted	Subjects were randomly allocated (using computer generated random number list) to one of the following two treatment groups- Group A: the study drug, one tablet each tablet containing 150 mg of standardized extract of dried ginger) three times daily or Group B; the comparator drug DOXINATE, one tablet 9each tablet containing doxylamine 10 mg, as succinate, and pyridoxine 10 mg, as hydrochloride) two or three times daily	For each individual subject, the study consisted of 3 weeks of active treatment, with follow-up visits at the end of first and second weeks. Between group comparisons of the nausea and vomiting parameters, did not reveal any difference at any time point. Thus the groups were comparable at baseline and remained so at study end and at both the intervening follow-up visits.	Only 1 subject out of the 34 [0.68%] evaluated from Group A, complained of two different adverse events. This was body ache and loose stools, occurring at different times. Two subjects out of the 29 in group B [0.585] suffered from hyperacidity. The duration, in all three instances, was short (<2 days), the intensity moderate, and the outcome satisfactory. None of these events was considered to be related to study drug by the investigator concerned.

3	Double blind randomized controlled trial.	Between January 2005 and December 2005	Pregnant women with nausea and vomiting were eligible for the trial if they were less than 16 weeks of gestation.	1) had any signs of clinical dehydration, 2) had other gastrointestinal diseases, 3) unable to take oral capsule, 4) unable to return for one week follow up, 5) had known allergy to ginger or dimenhydrinate, 6) had taken other medication in the past week that might aggravate or alleviate nausea and vomiting,	85 pregnant women were randomly allocated to receive either a 0.5 gm capsule of ginger (group A) or 50 mg capsule of dimenhydrinate (group B) orally twice daily for one week.	The frequency of vomiting times in day 1-7 of the treatment was decreased in both groups. After day 3-7 post treatment, the daily mean vomiting times in both groups were not statistically different ($p > 0.05$).	The occurrence of drowsiness in the ginger group and dimenhydrinate group were 5/85 (5.88%) versus 66/85 (77.64%) ($p < 0.01$). The occurrence of heartburn was 13/85 (15.2%) versus 9/85 (10.58%) ($p = 0.403$), respectively. No other adverse effect was observed in both groups during the one-week follow up.
4	Single blind clinical trial study	June and July 2005.	Under 20 weeks gestational age	without any medical or surgical history, without a history of smoking or drug use	70 pregnant women were randomly allocated. Four (4) ginger capsules were prescribed daily to the experimental group for 4 days. Each capsule contained 250 mg of ginger root powder sold under the trade name Zintoma (Goldaroo Company)	Nausea intensity improved significantly in 84% of ginger users versus 56% of the women in the control group (Mann-Whitney test, p _ 0.05)	None of the participants reported any complications during the treatment period

5	A randomized double-blind clinical trial. Either ginger (n=35) or non-ginger containing (placebo) (n=30) biscuits.	during 2005-2006	At the beginning of pregnancy and being in 7 and 17 weeks of gestation	Women who received antiemetic agents such as vitamin B6, metoclopramide or drugs enhancing the condition such as iron tablets during last week	**0.5-g** of ginger as fine powder was incorporated in each ginger biscuit. Every subject was handed 20 biscuits. They took five biscuits daily for four days.	The average change in nausea scores (baseline minus average post-therapy nausea scores of day 1-4 for all subjects) in the ginger group was significantly greater (P=0.01) than that in placebo group	1 patient (3.12%) complained from dizziness and 1 (3.12%) from heartburn due to ginger biscuit, which were mild. No abnormal pregnancy and delivery outcome ocurred and no infants had any congenital abnormalities recognized and all were discharged in good condition.
6	A randomized double-blind clinical trial	Over a 3 - month period 5 April and 5 July 2006,	Pregnant women with nausea, who first attended the antenatal clinic at or before 17 weeks gestation	(1) had other medical disorders such as hepatitis or gastrointestinal diseases that might manifest with nausea or vomiting; (2) had mental health problems; (3) had taken other medication in the previous week that might aggravate or alleviate nausea or vomiting, such as iron tablets or antiemetics	70 women were randomised to receive either ginger **1 g/day** or vitamin B6 40 mg/day for 4 days.	The median change in nausea score (baseline minus average post-therapy nausea score)in the ginger group was significantly greater (p ¼ 0.024) than that in the vitamin B6 group. {1WEEK FOLLOW UP VISIT}	There were two spontaneous abortions in the ginger group and one in the vitamin B6 group. No babies had any congenital anomalies and all were discharged in good condition.

7	A cross-sectional survey of women during early pregnancy or immediately postpartum in North-East Scotland.	March-August 2012	Data assessing the use of CAM collected from women attending for their mid-trimester (18–21 weeks) scan (n = 332) and women, within the first 24 h following a live birth, admitted to the postnatal unit (n = 557) at the Royal Aberdeen Maternity Hospital, North-East Scotland were combined	Non-consenters.	The survey was completed by 889 respondents (73% response rate). "Users" in the early pregnancy group reported the use of 16 different herbal and natural products, of which ginger was the most commonly cited (35.6%). In the late pregnancy group, a total of 20 herbal and natural products were reported, ginger (23.7%).	of the 34 potential interactions, almost all were rated as moderate (93.9%), one as a potentially major (ginger and nifedipine)	Significantly inhibits platelet aggregation, synergetic effects, may lead to potential cardiovascular and cerebrovascular Complications.
8.	Randomized, double-blind, placebo controlled trial	Between June 2016 and June 2017	Post cesarean section women aged 18 to 40 years within 24 hours postpartum	Women with operative time more than 1 hour, had another procedure during cesarean section such as appendectomy or ovarian	One hundred and seventy-eight post cesarean section women were enrolled into the study. All women were randomly assigned to two groups: 89 received ginger	The incidence of postoperative abdominal distention was not different between the ginger and placebo groups (20.2% vs 29.2%, p =	There were constipation among 13 patients and heartburn in 6 patients and nausea and vomiting in 2 patients and diarrhea in 6 patients among ginger treated group patients. And 17 patients had

				cystectomy, already had abdominal distention, had a history of carminative drugs use, and known allergy to ginger were excluded	and 89 received placebo. Ginger (*Zingiber officinale* Roscoe, 500 mg per capsule) (Abhaibhubejhr, Thailand) was assigned to the treatment group and corresponding placebo to the placebo group. Drug dose was 2 capsules three times after meal. Treatment was started when the women started drinking water and continued for 3 days. Treatment assignment was not revealed until data collection was completed.	0.328). The severity of abdominal distention on the first – third day after operation was not different between groups, but on the fourth day after operation, the severity of abdominal distention was significantly lower in the ginger group than the placebo group (median visual analogue scale 10 vs 20, p = 0.036). The efficacy to relieve abdominal distention was also superior in the ginger group; more women in the ginger group felt that the drug can improve their symptom when compared to the placebo group (91% vs 65.2%, p < 0.001	constipation, 2 patients had nausea and vomiting and 2 patients had heartburn and 3 patients had diarrhea among placebo group.

9.	A randomized, double-blind controlled trial	August 2015–April 2016	Healthy pregnant women aged 18 years and above who deliver a term baby (‡37 weeks gestation) at our hospital and aim to exclusively breastfeed her baby for at least 6 months.	Participants who had serious medical conditions presumed to result in mother–infant separation and decreased breastfeeding frequency (e.g., postpartum hemorrhage, postpartum sepsis), allergic to ginger, or have a contraindication to breastfeeding such as HIV infection	68 women were enrolled, and 34 were randomly assigned to each study group. Participants were randomized to receive either 1000mg/day of dried ginger capsule orally (ginger group) or placebo (placebo group. one capsule (500mg) twice daily for 7 days postpartum, with the first dose started within 2 hours after her delivery.	The nursing mother in the ginger group has higher milk volume (191.0 – 71.2 mL) than the placebo group (135.0 – 61.5 mL). The mean serum prolactin levels were similar in both groups (321.5 – 131.8 in the ginger group, and 331.4 – 100.7 in the placebo group, p = 0.74).	For the ginger group, four participants were excluded (three withdrew from the study, and one developed postpartum endometritis and sepsis. (ON DAY 3 ASSESSMENT)

STUDY TITLE:

1. Effect of a ginger extract on pregnancy-induced nausea: A randomised controlled trial[9]

2. A Single-masked, Randomized, Controlled Trial of Ginger Extract in the Treatment of Nausea and Vomiting of Pregnancy.[10]

3. A Randomized Comparison of Ginger and Dimenhydrinate in the Treatment of Nausea and Vomiting in Pregnancy.[11]

4. Effects of Ginger Capsules on Pregnancy, Nausea, and Vomiting.[12]

5. The Effect of Ginger Biscuit on Nausea and Vomiting in Early Pregnancy.[2]

6. Comparing ginger and vitamin B6 for the treatment of nausea and vomiting in pregnancy: a randomised controlled trial.[13]

7. Pregnancy, prescription medicines and the potential risk of herb-drug interactions: a cross-sectional survey.[14]

8. A randomized, double-blind, placebo-controlled trial on the efficacy of ginger in the prevention of abdominal distention in postcesarean section patients.[15]

9. The Effect of Ginger on Breast Milk Volume in the Early Postpartum Period: A Randomized, Double-Blind Controlled Trial.[6]

RESULTS AND DISCUSSION:

Whether the herbal medicines would be a safer alternative in pregnant and lactating women? Above are the studies which warrants that ginger is as efficacious as the pharmacologic therapy with mild symptoms, except in some studies which documented major effects like spontaneous abortions and stillbirth. In a study on Effect of a ginger extract on pregnancy-induced nausea as a randomised controlled trial involving 120 women concluded that at doses of 125 mg ginger extract equivalent to 1.5 g of dried ginger given four times per day for 4 days, there were two spontaneous abortions, one stillborn, one neonatal death among the ginger group. And a Single-masked, Randomized, Controlled Trial of Ginger Extract in the Treatment of Nausea and Vomiting of Pregnancy was conducted which involved 78 women concluded that at doses of one tablet, each tablet containing 150 mg of standardized extract of dried ginger three times daily had one subject with complaints of body ache and loose stools, occurring at different times which considered to be unrelated to study drug by the investigator concerned.

A Randomized Comparison of Ginger and Dimenhydrinatein the Treatment of Nausea and Vomiting in Pregnancy involving 170 Pregnant women showed that there were drowsiness and heartburn being the side effects and drowsiness being more common with dimenhydrinate group treated patients and heartburn was comparatively frequent in the ginger treated group at the dose of 0.5 g capsule of ginger twice daily for one week. And Effects of Ginger Capsules on Pregnancy Nausea and Vomiting was conducted with the subjects included 67 pregnant women with same dose as the study above with frequency

being different 250 mg four times daily summarized that none of the participants reported any complications during the treatment period.

The Effect of Ginger Biscuit on Nausea and Vomiting in Early Pregnancy in Babol town, Northern Iran performed a double randomized controlled trial among 65 women were given 5 biscuits daily (0.5 g of ginger fine powder incorporated in each biscuit) for 4 days have concluded that dizziness and heartburn in two subjects and no abnormal pregnancy and delivery outcome occurred and no infants had any congenital abnormalities recognized and all were discharged in good condition.

And in the study of Comparing ginger and vitamin B6 for the treatment of nausea and vomiting in pregnancy: a randomised controlled trial, involving 70 Pregnant women were randomized to receive 1 g/ day of ginger and this study reported that there were two spontaneous abortions in the ginger group.

A randomized, double-blind, placebo-controlled trial on the efficacy of ginger in the prevention of abdominal distention in post cesarean section patients involved.

178 Post cesarean section women were randomly given 2 capsules three times after meals and one capsule contains 500 mg of ginger and this trial reported that there were constipation among 13 patients and heartburn in 6 patients and nausea and vomiting in 2 patients and diarrhea in 6 patients among the ginger treated group.

The Effect of Ginger on Breast Milk Volume in the Early Postpartum Period in Thailand conducted a randomized, Double-Blind Controlled Trial involving 68 women, in which after randomization the ginger treated group with the doses of 1000mg per capsule twice daily for seven days post-partum concluded that four participants were excluded (three withdrew from the study, and one developed postpartum endometritis and sepsis) which was not conclusive that it was pertaining to ginger consumption.

CONCLUSION

For the most part, its seen in the study included that when given 250 mg doses of ginger four times daily had shown no side effects and any congenital abnormalities but at the same dose when given as 500 mg twice daily had shown in another study as mentioned above reported minor side effects like heartburn. So, it is evident from the study included in this review that

with the doses of 250 mg four times daily, the ginger is relatively safer in the pregnancy for nausea and vomiting.

As for the ginger use in the lactating women, the study included had reported that on third day assessment while using 1000 mg capsule of ginger twice daily, one patient had developed the postpartum endometritis and sepsis and this was not conclusive whether it was pertaining to ginger consumption or the usual complication with postpartum. So more studies are needed to be done to assure the safety of ginger use among the lactating women especially concerning the increased breast milk production.

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