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The Effect of Aromatherapy on Nausea and Vomiting during Pregnancy: A Systematic Review and Meta -Analysis

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Abstract

Background

Most pregnant women suffer from nausea and vomiting during pregnancy (NVP) as one of the common discomforts compelling women to increasingly turn to herbal medications for help, including lemon inhalation aromatherapy as investigated in the current systematic review and meta-analysis. We aimed to evaluate the effect of aromatherapy on relieving nausea and vomiting during pregnancy.

Materials and Methods

In the present study, electronic sources in English (Medline [via PubMed], Scopus, Web of Science, and Cochrane Library); and databases in Persian (SID and Magiran) were systematically searched without any time constraints until February 10, 2018. Following keywords were used to find research articles related to the effect of aromatherapy on the NVP: (Nausea OR Vomiting) AND (Aromatic therapy OR Essential oil OR Essential oils OR Fragrance OR Fragrant oil OR Fragrant oils OR Scent OR Alternative Medicine OR Complementary Medicine) AND (Pregnancy).

Results

Four studies were included in systematic review. The results of this study reported that aromatherapy with lemon compared to placebo improves the severity of nausea and vomiting in pregnant women, but Mentha and Peppermint oil alone or in combination with lavender, showed no significant improvement. There was no significant difference between the placebo and aromatherapy groups regarding total score of nausea and vomiting among pregnant women at the third day (standardized mean difference [SMD] = -0.347; 95% Confidence Interval [CI]: -0.980 to 0.287; P=0.284, heterogeneity; I^2=72%; P=0.054).

Conclusion

Aromatherapy did not show any beneficial effect on nausea and vomiting among pregnant women. Only aromatherapy with lemon oil can be beneficial.

Key Words: Aromatherapy, Nausea, Pregnancy, Vomiting.

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1- INTRODUCTION

Nausea and vomiting during pregnancy (NVP) is a problem that is hard to bear for pregnant women (1, 2). The NVP severity has been reported to reduce the quality of life (QOL), to have multiple complications in social and occupational dimensions as well as daily activity and to induce stress and depressive symptoms (3-7). A study reported an increase in preterm labor and the duration of hospitalization of the newborns. Low Apgar score at birth, increased frequency of preterm labor and low birth weight have been observed in patients with severe vomiting in pregnancy compared to control group. Hyperemesis gravidarum (HG) is associated with problems such as esophageal rupture, Mallory-Weiss syndrome, pneumothorax, eclampsia and intrauterine growth restriction (8). Previous studies have shown that the hyperemesis gravidarum can be developed due to NVP, which can lead to maternal weight loss, severe body dehydration, electrolyte imbalance, and high urinary ketones among 1-2% of pregnancies (9, 10).

The treatments of nausea and vomiting during pregnancy include anti-nausea agents, complementary and alternative medicine (CAM) such as medicinal plants, dietary restrictions, fluid therapy, psychotherapy, drugs affecting the brain, and total parenteral nutrition. Most anti-nausea drugs have been reported by the Food and Drug Administration in Category C, and there is limited information on the safety of these drugs during pregnancy (11). Since the adverse effects of the drugs used for nausea and vomiting during pregnancy have been identified, the use of Diphenhydramine has been associated with an increase in orofacial cleft (12). Concerns about the adverse effects of such drugs on the fetus have caused many women not to seek treatment or to try to use alternative therapies to treat their nausea and vomiting. The CAM seems to offer a non-drug safe solution for many health concerns. One of the most commonly used CAM cases is herbal medicines. The CAM, including herbal medicine, is well-liked by many mothers, as many women have a positive attitude toward the safety and efficacy of CAM (11). According to a review study (2010) in Cochrane database, limited evidence was found to support the role of medications, such as vitamin B6 and antiemetic medications, in relieving mild or moderate NVP, as well as the significant benefits of non-pharmacological methods, such as acupressure. Studies have indicated the possible benefits of ginger products but the documents are limited. The pregnant women are currently interested in taking non-medicinal and herbal products due to the negative consequences of drugs in early pregnancy (3).

Among these, aromatherapy is the most common non-pharmacological approach. Aromatherapy refers to the use of essential oils or aromas extracted from aromatic plants for therapeutic purposes, which are administered via massage and inhalation (13, 14). Considering the fact that several studies have been done to determine the effect of aromatherapy on nausea and vomiting, and there is no systematic review regarding the effect of aromatic plants on the severity of nausea and vomiting, the present systematic review and meta-analysis was designed to assess and summarize the results of clinical trials on the effect of aromatherapy on nausea and vomiting during pregnancy.

2- MATERIALS AND METHODS

2-1. Method

This study is a systematic review that used meta analysis to assess the effect of aromatherapy on nausea and vomiting during pregnancy. To accomplish the present study, the electronic sources in English, including Medline (via PubMed),

Scopus, Web of Science, and Cochrane Library were systematically searched without any time constraints until February 10, 2018. The following keywords were used to find research articles related to the effect of aromatherapy on the NVP: (Nausea OR Vomiting) AND (Aromatic therapy OR Essential oil OR Essential oils OR Fragrance OR Fragrant oil OR Fragrant oils OR Scent OR alternative medicine OR Complementary Medicine) AND (Pregnancy). For completeness of the study, databases in Persian such as SID and Magiran were also searched with keywords of aromatherapy, nausea and vomiting (in Persian), followed by reviewing the references of the review articles on nausea and vomiting and aromatherapy, and the references of articles included in our study in order to find further related articles. Two authors independently reviewed the titles and abstracts of the articles. If the subject matter seemed to be relevant to our study, the full article would be extracted and reviewed. Finally, those articles that met the inclusion criteria were selected for quality assessment.

2-2. The inclusion criteria

All clinical trials evaluating the effect of aromatherapy on nausea and vomiting in pregnant women entered the study. The articles, regardless of the type of active ingredient used for aromatherapy, the method of using aromatherapy (massage and inhalation), and the therapeutic method used in the control group, were included in the study. Only articles in English and Persian languages were enrolled in the study.

2-3. Outcome measured

The severity of vomiting or nausea reported in the article and their comparison between the two intervention and control groups were considered as the main outcome of the study. Data extraction: a table was provided for extraction of data, containing the variables of first author, year of publication, type of study, the existence of blinding, main index of the examined samples, type of intervention and the contents of the essential oil used, control group, sample size in the intervention and control groups, NVP measurement tools and study outcomes (**Table.1**).

2-4. The quality assessment of articles

The Jadad scale (15) was used to evaluate the quality of the articles found in the search. This scale has five items in the following areas: randomization, method of randomization, blinding, method of blinding, and dropouts and withdrawals and related reasons. Homogeneity of the samples was added at the beginning of the study to the above items (**Table.2**) (*please see Tables 1 and 2 at the end of paper*).

2-5. Data extraction

A table was provided for extraction of data, containing the variables of first author, year of publication, type of study, the existence of blinding, main index of the examined samples, type of intervention and the contents of the essential oil used, control group, sample size in the intervention and control groups, NVP measurement tools and study outcomes.

2-6. Statistical analysis

Comprehensive Meta-Analysis software was employed to analyze the data. Cochran's Q test and I^2 index were recruited to evaluate homogeneity between studies. In this study, a fixed effect model was applied if the homogeneous condition was established and the random effect model in heterogeneous conditions. The effect size was calculated with the standardized mean difference (SMD). Forrest plot was used to display meta-analysis results.

3- RESULT

3-1. Baseline Characteristics

405 relevant studies were identified in the search. 373 studies were excluded by initial screening of titles and abstracts. 210 records after duplicates were removed. 210 records were screened; 32 full-text articles were assessed for eligibility; 28 studies excluded due to intervention were not aroma and/or subjects were pregnant; 4 studies were included in the systematic review and 2 studies were included in the meta-analysis. **Figure.1** shows the process of the selection of studies. The characteristics of 4 studies were included in the systematic review (**Figure.1**). Safajou et al. assessed the effect of lemon inhalation aromatherapy on nausea and vomiting during pregnancy. The mean difference of total scores of nausea and vomiting between two groups was statistically significant at first day (p=0.02), second day (p=0.001), third day (p=0.02), and fourth day (p=0.002) (3). The second study by Pasha et al. (16) assessed the effect of mint (Mentha) inhalation aromatherapy on nausea and vomiting of pregnancy. Intergroup comparison of two groups was not significant regarding nausea (p=0.140), and vomiting (p=0.577) severity. Joulaeerad et al. (17) compared the efficacy of aromatherapy with peppermint oil with placebo on the severity of nausea and vomiting in pregnancy. The repeated measures ANOVA showed a significant difference in both intervention (p<0.001), and control (p<0.001) groups. Intergroup comparison showed significant difference (p=0.227). Mahmoud Abdel Ghani and Ibrahim assessed the efficacy of aromatherapy inhalation on nausea and vomiting during pregnancy. Mixed essential oil containing peppermint and lavender was not significantly different for the frequency of nausea and vomiting episodes between the two groups. However, the frequency of nausea and vomiting episodes was significantly decreased in the intervention group compared to the baseline (18).

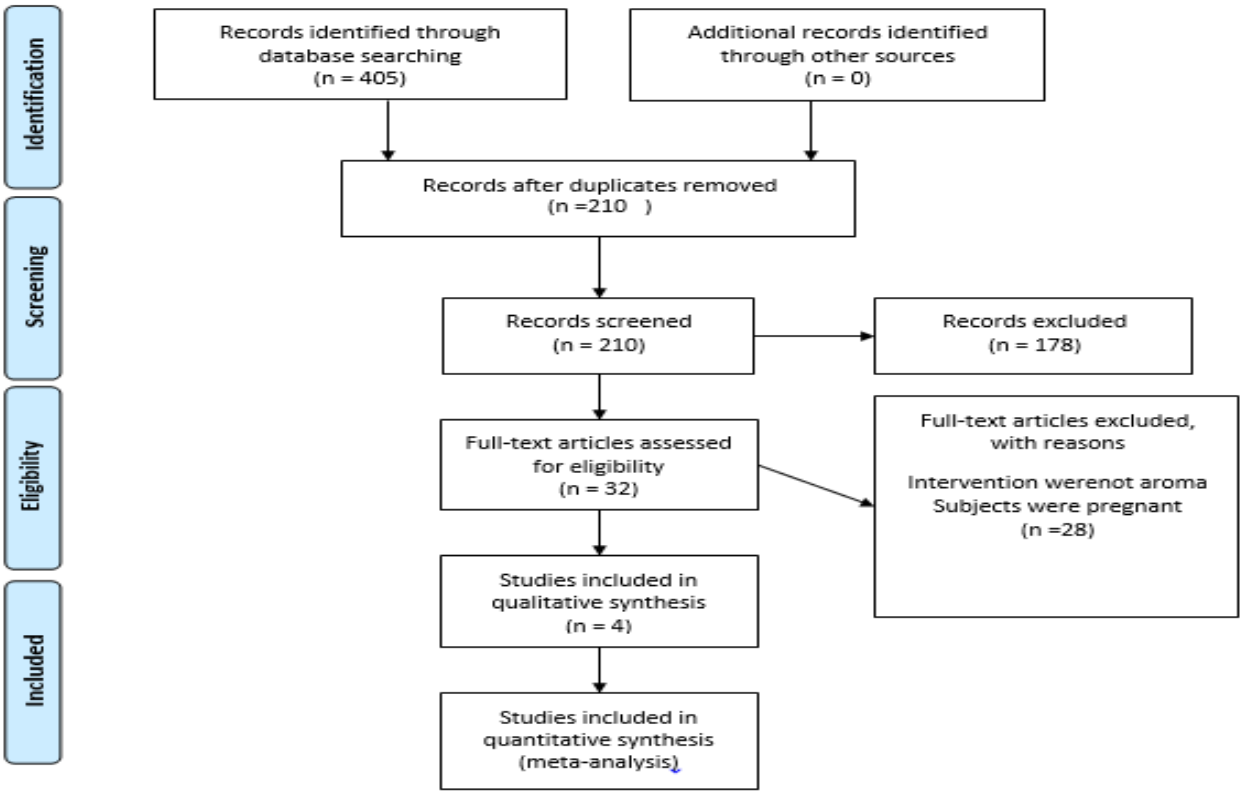

Fig.1: PRISMA flowchart of present study.

3-2. Meta-analysis

Two studies had adequate statistical information to include in the meta-analysis. There was no significant difference between the placebo and aromatherapy groups regarding total score of nausea and vomiting among pregnant women at day (SMD=-0.347; 95% Confidence Interval (CI): -0.980 to 0.287; P= 0.284, heterogeneity; I^2=72%; P=0.054; **Figure.2**). Heterogeneity was high. Therefore, we conducted sensitivity analysis. Studies were excluded one by one. However, it was not discovered which which studies were the potential resource of heterogeneity.

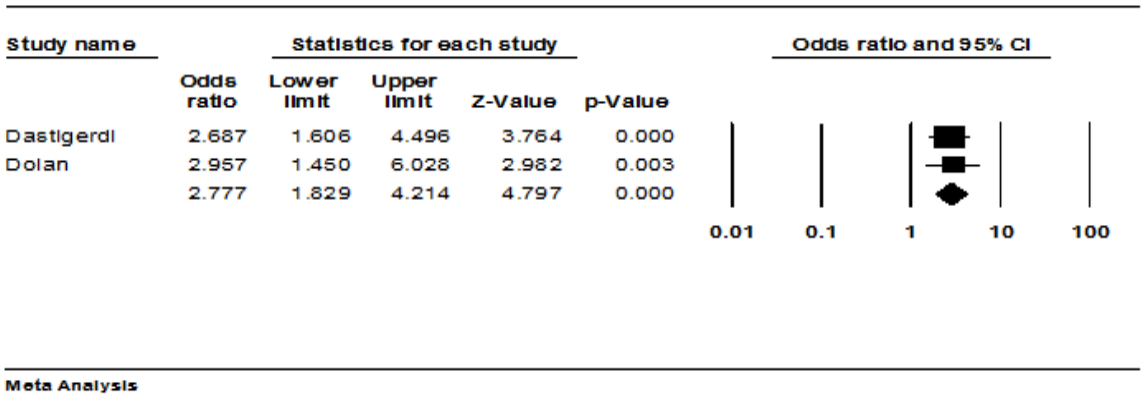

Fig.2: The effect of aromatherapy on nausea and vomiting.
■ Point estimate; ♦ Combined overall effect of treatment.

4- DISCUSSION

To the best of our knowledge, the present study is the first meta-analysis performed on clinical trials evaluating the efficacy of aromatherapy on nausea and vomiting among pregnant women. The results of this study reported that aromatherapy with lemon improves the severity of nausea and vomiting in pregnant women (3), but Mentha (16), and peppermint oil alone (17) in combination with lavender (18), both of which were not of the Lamiaceae family, showed no significant improvement. Similarly, there was no significant improvement in the nausea and vomiting during pregnancy following the use of peppermint oil and lavender in combination. The most common, the most specific and possibly the most painful problem in pregnancy is nausea and vomiting, which are commonly experienced by 50-90% of pregnant women, and have adverse effects on social life, family life and the subsequent psychological and economic issues (19). Approximately 25-66% of pregnant women suffering from this disorder need to take time off from work. In addition, nausea and vomiting during pregnancy have a negative effect on the relationships of about 50% of pregnant women or their spouses (20). In the acute vomiting during pregnancy, vomiting is severe enough to lead to electrolyte imbalance and metabolic disorders. Severe cases are associated with jaundice, fever, gastrointestinal bleeding, esophageal rupture, and fetal complications such as central nervous system abnormalities, congenital hip dislocation, intrauterine growth retardation and fetal death (21). In general, these four studies (3, 16-18) examined various medicinal herbs such as Mentha, Peppermint oil, Lemon and Marjoram. In the first study, the effect of

lemon inhalation aromatherapy on nausea and vomiting during pregnancy was studied. Nausea and vomiting between two groups was statistically significant in the first day, second day, third day, and fourth day. In the second study, intergroup comparison of two groups, mint (Mentha) inhalation aromatherapy and placebo was not significant regarding nausea, and vomiting severity (16). In the fourth study, intergroup comparison (Aromatherapy with Peppermint oil with placebo) significant difference was observed (p=0.227) (17).

In the fifth study, mixed essential oil containing peppermint and lavender was not significantly different for the frequency of nausea and vomiting episodes between the two groups (18). Peppermint, Mentha piperita L., belongs to perennial herbs native to Europe, and has been naturalized in the northern U.S.A, and Canada, and is under cultivation in many parts of the world. A hybrid of spearmint (Mentha spicata L.), and water mint (Mentha aquatica L.), and peppermint grow particularly well in areas with high water-holding capacity soil. They are characterized by their flavor and fragrance properties. The fresh and dried leaves of the peppermint and their essential oil are consumed in many food, cosmetic and pharmaceutical products (22-24). The peppermint oil was as effectives as placebo in improving nausea and vomiting (16, 17). A mixture of peppermint and lavender did not differ from placebo (18). Lack of the effect of peppermint oil may be due to the high placebo effect of inhalation aromatherapy with lemon showing beneficial effect on nausea and vomiting of pregnancy.

4-1. Limitations

There are several limitations in this study. High heterogeneity was one of the main limitations of the study. Sensitivity analysis was unable to identify potential resource of heterogeneity (3). The mechanisms of aromatherapy were examined. It is suggested that future studies should focus more on this topic. Some of the studies examined in this systematic review had a low methodology quality. These deficiencies were the absence or inappropriate reporting of a random allocation sequence, the absence or inappropriate reporting of blindness, the absence of intention to treat analysis. It is suggested that future studies should be designed and reported based on the consort guideline. Other limitations of this study include a small number of studies and a small sample size, indicating the need for further studies with a larger sample size in this regard. The inhalation aromatherapy with lemon showed beneficial effect on nausea and vomiting (3).

Further studies are also needed to investigate the impact of Lemon treatment compared with other conventional therapies. Considering the prevalence of nausea and vomiting and the side effects of corresponding medications, the results of this study suggest the evaluation of the medicinal plant effects on severe nausea and vomiting during pregnancy, meaning a condition in which persistent vomiting causes weight loss and electrolyte imbalance (19). Last limitation was related to the small number of studies included in the systematic review and meta-analysis.

5- CONCLUSIONS

Aromatherapy with lemon oil can have beneficial effects on the improvement of nausea and vomiting; though peppermint alone and in combination with lavender had no significant effects on nausea and vomiting during pregnancy. Due to the interest of pregnant women in complementary medicine and the low-cost of this therapeutic approach, it can be employed as a useful way to improve these disorders.

6- CONFLICT OF INTEREST: None.

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Table-1: General characteristics of included studies.

Authors/ Country/ Year	Age of intervention /control	Number of subjects in intervention /control	Type of intervention	Control group	Duration	Drop out %	Results
Safajou et al., reference (3), 2014, Iran	Lemon/26.2 Control/25.7	50/50	Lemon oil 2 drops placed on cotton/ Inhale deeply three times	Normal saline	4 days	0	The mean difference of total Scores of Nausea and Vomiting between two groups was statistically significant at the first day (p=0.02), second day (p=0.001), third day (p=0.02), and fourth day (p=0.002).
Joulaeerad et al., reference (17) 2017, Iran	Peppermint oil /or placebo	28/28	Peppermint oil /or placebo	Normal saline	4 days	0	The repeated measures ANOVA showed a significant difference in both intervention (p<0.001), and control (p<0.001) groups. Intergroup comparison showed significant difference (p=0.227).
Pasha et al., reference (16) 2012, Iran	Mint oil/24 Placebo/25	33/34	Bowl of water with 4 drops of pure mint oil	Normal saline	4 days	11	Intergroup comparison of two groups was significant regarding nausea (p=0.140), and vomiting (p=0.577) severity.
Ghani et al., reference (18), 2013, Saudi Arabia	Intervention/24 Placebo/25	50/51	Lavender and peppermint oil	Placebo	4 days	0	The frequency of nausea and vomiting episodes was significantly decreased in the intervention group compared to the baseline.

Table-2: Assessment of Methodological quality of studies

Author, Reference, Year, Country,	Randomization			Blinding			Sample
	Mentionrandomization	Method: appropriate	Method: inappropriate	Mention blinding	Method: appropriate	Method: inappropriate	Account of all patients
Safajou et al., reference (3), 2014, Iran	*	*	-	*	*	-	*
Joulaeerad et al., reference (17), 2017, Iran	*	*	-	*	*	-	*
Pasha et al., reference (16), 2012, Iran	*	*	-	*	*	-	*
Ghani et al., reference (18), 2013, Saudi Arabia	*	*	-	*	*	-	*
Method: appropriate (*), Method: inappropriate (-).							