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THE EFFECT OF GINGER AND LEMON AROMATHERAPY ON NAUSEA AND VOMITING AMONG PREGNANT WOMEN

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ABSTRACT

Nausea and vomiting of pregnancy (NVP) is the most common complaint among women during pregnancy. NVP has effects on quality of life, social and general well-being. The aim of this study was to determine the effect of ginger and lemon aromatherapy on nausea and vomiting among pregnant women. This study used randomized controlled trial design. A total of 90 pregnant women who experience NVP and meet all the eligibility criteria were randomly assigned into ginger, lemon or placebo groups. Women were asked to record their nausea and vomiting for 7 days using PUQE-24. In the first three days, they were advised to adjust their diet and then received aromatherapy at the following day until day-7. Data were analyzed by using ANOVA, Kruskal Wallis, Chi Square and Wilcoxon test. PUQE total scores before and after intervention in the ginger, lemon and placebo groups were 7.67±2.304 vs. 6.85±1.575, p=0.000; 7.16±1.598 vs. 5.50±1.448, P = 0.000 and 6.70 ± 1.787 vs 5.50 ± 1.803, *P* value 0.002 respectively. Ginger and lemon essential oil is equally effective in reducing nausea and vomiting among pregnant women.

Keywords: aromatherapy, ginger, lemon, nausea, vomiting

ABSTRAK

Mual muntah kehamilan (Nausea and vomiting of pregnancy/ NVP) adalah keluhan yang paling umum dari wanita selama kehamilan NVP berdampak pada kualitas hidup, sosial dan kesejahteraan ibu hamil. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh aromaterapi jahe dan lemon pada mual muntah pada ibu hamil. Penelitian ini menggunakan desain randomized controlled trial. Sebanyak 90 wanita hamil yang mengalami mual muntah kehamilan dan memenuhi seluruh kriteria yang ditetapkan dibagi secara acak ke dalam 3 kelompo:, jahe, lemon atau placebo. Responden diminta untuk mencatat mual dan muntah selama 7 hari dengan form PUQE-24. Pada tiga hari pertama mereka disarankan untuk mematuhi pola makan dan pada hari berikutnya sampai hari ke7 mendapatkan aromaterapi. Data dianalisis menggunakan uji ANOVA, Kruskal Wallis, Chi Tes Square dan Wilcoxon. Total skor PUQE sebelum dan sesudah intervensi pada kelompok jahe, lemon dan plasebo adalah 7,67 ± 2,304 vs 6,85 ± 1,575, P = 0,000; 7,16 ± 1,598 vs 5,50 ± 1,448, P = 0,000 dan 6,70 ± 1,787 vs 5,50 ± 1,803, Nilai 0,00. Minyak esensial jahe dan lemon sama efektif dalam mengurangi mual dan muntah pada ibu hamil.

Kata kunci: aromaterapi, jahe, lemon, mual, muntah.

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BACKGROUND

The pregnancy process involves changes in a woman's physical, physiological and psychological aspects. Physiological changes at the first trimester are including hormonal changes. During this time estrogen and progesterone increase which causing nausea and vomiting (Pilitteri, 2010; Lowdermilk, Perry, Cashion, & Alden, 2012).

Nausea and vomiting, which often called as “morning sickness”, is experienced by 50-80% of pregnant women (Parisa, Farzaneh, Mahnaz & Hossein, 2014; Farzaneh, Zohreh, Masoumeh, & Mahboobeh, 2013). About 2% of pregnant women reported that nausea and vomiting occurred in the morning. However, almost 80% of pregnant women said that it happened throughout the day with mild to moderate criteria at 9 weeks' gestation and decreases before week 14. As many as 13% of pregnant women experienced nausea and vomiting until 20 weeks of pregnancy (Mahmoud & Ahmed Ibrahim, 2013). Nausea and vomiting on pregnancy was found to disturb daily life functions of the pregnant women, including caring for children (84%), reduce work productivity (94%) and quality of life and also elevate anxiety level (Heitmann, 2017; Beyazit & Sahin, 2018).

Nausea vomiting also affects the psychosocial conditions of pregnant women such as lack of energy, fatigue, irritability, lack of interest and enjoyment, and also lack of preparation for childbirth (Lacasse, Rey, Ferreira, Murin, & Berard 2008; Munch, Korst, Hernandez, Tomero , & Goodqin, 2011). The pathophysiological process of nausea and vomiting during pregnancy is not clearly known. Some treatments are given to treat symptoms. Treatment is given according to the severity and variation of changes in diet and lifestyle (Heitmann, Svendsen, Sporsheim, & Holst, 2016). As many as 34% of women did not take vitamin B6 and 26% of them reduced the dose because they were afraid of the side effects of medications used during pregnancy. As a result, many pregnant women prefer to use non-pharmacological treatment to treat the symptoms. Several studies have shown that some non-pharmacological treatments were effective for treating nausea and vomiting of pregnancy, including acupuncture, extract of ginger, mint and lemon (Farzaneh et al., 2013; Ozgoli, Goli, & Simbar, 2009; Heitmann Nordeng, & Holst, 2013; Pasha, Behmanesh, Mohsenzadeh, Hajahmadi, & Moghadamnia, 2012).

Ginger is an herbal plant belonging to the *Cardamon* and *Turmeric* family. It has strong aroma and is widely grown in Asia. Ginger is widely studied for treatment in variety of conditions such as nausea, vomiting, pregnancy and arthritis (Giacosa et al., 2015; Lete & Allue, 2016). Pharmacologically, ginger has many chemical compounds that function as anti-inflammatory, analgesic, anti-oxidant; and immune stimulant. Ginger can be also used to treat discomfort. However, antiemetic activity of Ginger is relatively unknown. Ginger seems regulates the level of serotonin receptors in digestive tract (Thomson, 2014; Giacosa et al., 2015). Some active components of ginger include volatil, gingerols, beta-carotene, capsaicin, caffeic acid, and curcumin. In addition, salicylate has been found in ginger in the amount of 4.5 mg/ 100g in fresh rhizomes (Lete & Allue, 2016). Herbal drug ginger (Zingiber ifficinale) may be effective for treating nausea, vomiting and gastric hypomotility. Ginger has two major classes of phytochemicals. The first is volatile oils, which give ginger its pleasant smell and the second is the non-volatile compounds (eg., gingerols and zingerones), which has piquant taste and pharmacological effects (Haniadka, Rajeev, Palatty, Arora, & Baliga,, 2012; Ozgoli et al., 2009; Thomson, 2014).The use of ginger during pregnancy did increase risk of congenital abnormalities, neonatal mortality, low birth weight babies (LBW) and low APGAR values (Heitmann, Nordeng, & Holst, 2013). Ginger can be used in the form of powder, oil, drink and other forms of extract. Ginger essential oil is easy to use and considered to be effective to treat symptoms during pregnancy. However, randomized control trial study on ginger essential oil for

treating nausea and vomitus is still limited at this time.

Another non-pharmacological treatment that often used by pregnant women and considered safe for pregnancy is lemon essential oil. One to two drops of lemon cotton essential oil or near the bed was found to be effective to reduce nausea and vomiting (; Kim, Lee, Yang, & Hur, 2011; Pasha et al., 2012). As many as 40% of women use lemon scent to treat nausea and 26.5% of them reported it was effective to control the symptom (Parisa et al., 2014; Mahmoud & Ahmed Ibrahim, 2013).

It was expected that this study would add evidence-based therapy to improve the quality of life of women during pregnancy. Effective, efficient, practical therapy at an affordable cost can be a solution to problems in early pregnancy.

METHODS

This was an experimental research with randomized control trial design. The research was conducted in May-September 2018 in the area of the District Health Centre in the city of Semarang, Central Java. This study had gained ethical approval from ethical committee of Karya Husada Health and Science College of Semarang (number: 294 / KH. KKEK/KT/IV/2018). A total of 90 pregnant women participated in this study. They were assigned into three groups, ginger, lemon or placebo (almond oil). Sample criteria were pregnant women with a maximum gestational age of 16 weeks, experienced mild to moderate nausea, vomiting, single pregnancy, had no gastrointestinal disease, had no history of anti-emetic treatment in the last three weeks. Pregnant women who experience side effects following the treatment or experience nausea and vomiting more than 5 times a day were excluded from the study.

At initial stage, after gaining ethical approval, researchers selected pregnant women who meet the criteria. Respondents were then given explanation regarding the research procedure and visit schedule. Screening of early pregnancy nausea and vomiting was done using PUQE-24. The questionnaire consisted of 3 questions using 1-5 Likert scale points to measure the duration of nausea and frequency of vomiting in 24 hours. Mild pregnancy vomiting if the score is ≤ 6, moderate if score 7-12 and weight if score ≥ 13.

The procedure was conducted for 7 days. Respondents filled out the PUQE-24 questionnaire from day 1 until day 7. During the first three days, they were not given any intervention, but they were taught suggested diet to reduce nausea and vomiting, such as eating little but often, reducing foods high in carbohydrates and fats, avoiding foods that stimulate nausea and vomiting, avoiding fried and spicy foods, avoiding gas-containing drinks, starting to eat before hungry. Pregnant women were also asked to avoid smoking and eat biscuits when they wake up. All of suggestion was recorded in daily record book. After that, at day 4 until day 7, all groups (ginger, lemon, and placebo) received treatment. Ginger and lemon essential oils diluted in almond oil to get final concentration of 10%. Placebo group received almond oil only. The oils were packaged in the same wrap and numbered 10 cc per bottle. 7. Respondent were asked to take 2 drops of essential oil and put on a cotton swab then inhale for a maximum of 3-5 minutes until the symptoms reduced. Researcher did the visit 3 times, first at day 1 when giving explanations and informed consent, second visit at day 4 and the last visit on the 8th day to collect questionnaires and do evaluation. The process can be seen in Figure 1.

Results were analyzed by using SPSS 16.0. Univariate analysis was used to describe characteristics of pregnant women including age, gestational age (mean and standard deviation), and also education and work (percentages). One way ANOVA test was used to analyzed differences in mean of respondent's and gestational age among three groups. Chi Square test was used to analyze differences in work and education of the three groups. Normality test showed that distribution of the PUQE data was not normal, so non-parametric tests was used.

Kruskal Wallis test was used to analyze mean rank differences of nausea and vomiting symptoms from days 1-7 and of PUQE Score before and after treatment among three groups. Wilcoxon test was used to analyze mean rank differences of symptoms reduction before and after each treatment. The research flowchart can be seen in Figure 2.

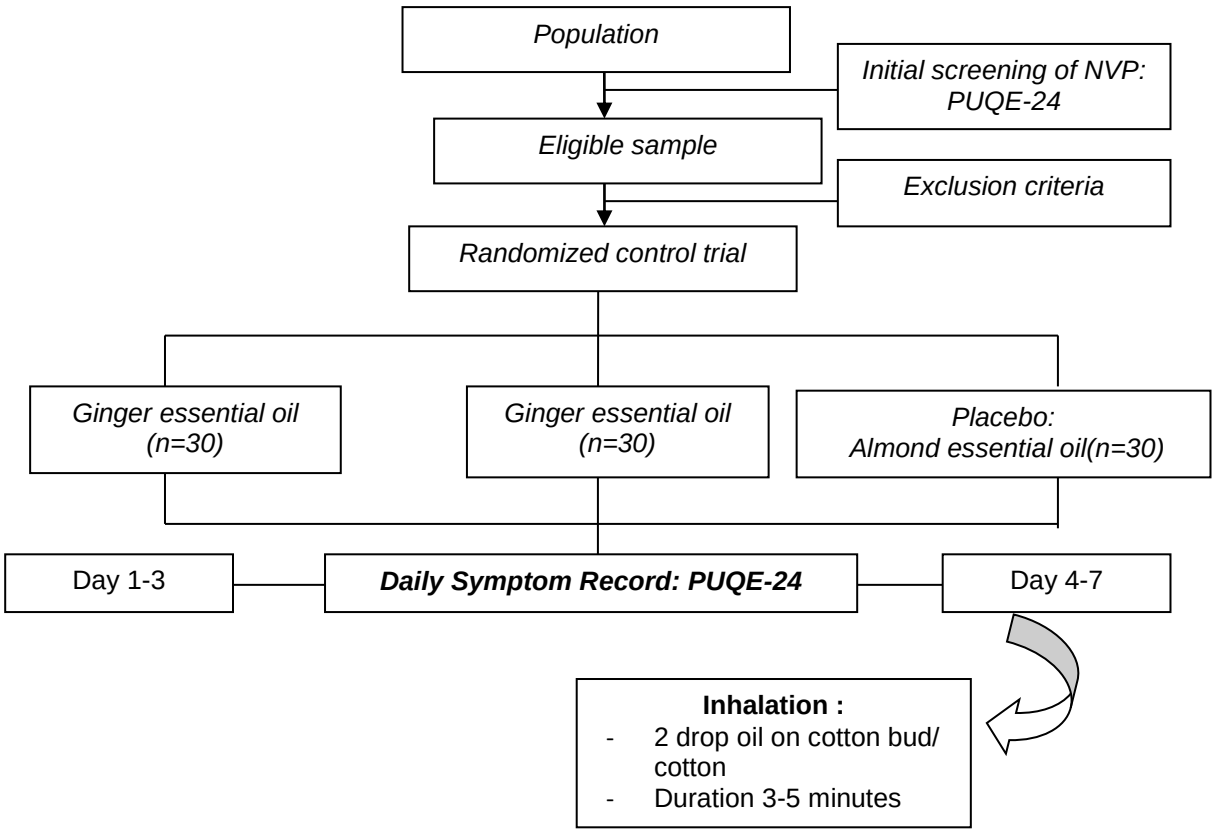

Figure 1. Research Flowchart

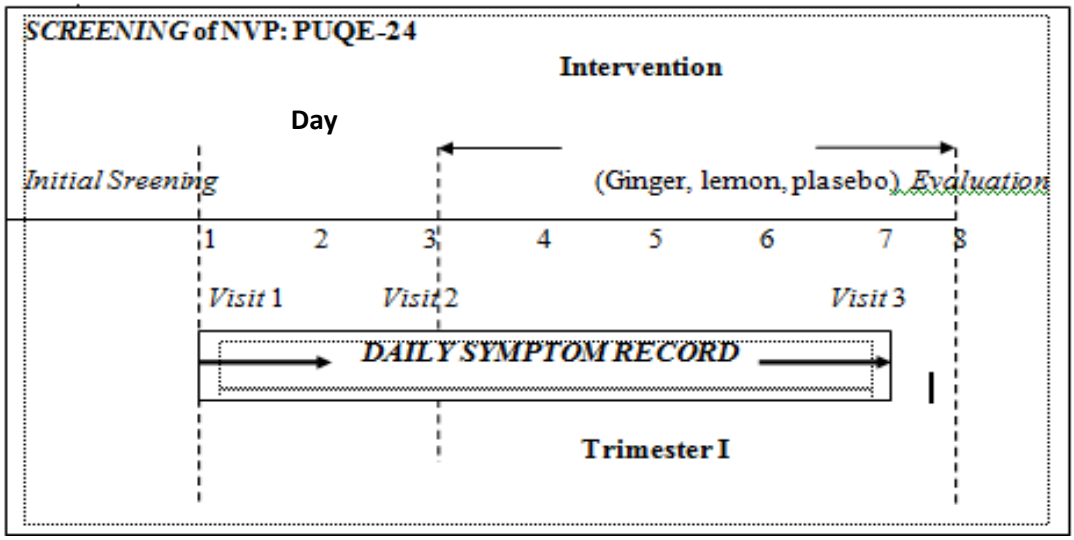

Figure 2. Research Flow Map

RESULTS

Table 1 showed description of respondent's characteristics, including respondent's age, gestational age, educational and occupation. Result showed that there were no differences in mean respondents' age and gestational age among groups (p= 0.311 and p=0.457 respectively). Job and education level were also not differ among groups (p=0.469 and p=0.474). Table 2 showed PUQE score distribution before and after aromatherapy. Results showed that there were differences in PUQE scores among groups (p<0.005). There was also a difference in PUQE score reduction before and after treatment among groups (p=0.028). PUQE score on days 1-7 showed in table 3 that there were differences in nausea and vomiting duration among groups, except for day 7 (p=0.527). Frequencies of dry vomiting were not differ significantly among groups, except for day 7 (p=0.01).

Table 1. Characteristics of respondents (n=188)

Characteristics	Ginger(n=30)	Lemon (n=30)	Plasebo (n=30)	Pvalue
Age(year), mean±SD	26,50±4,257	25,50±3,767	24,90±4,172	0,311*
Gestational age (year), mean±SD	10,00±3,648	8,87±3,589	9,70±3,612	0,457*
Occupation, f (%)				
Housewife	16(53,3)	20(66,7)	20(66,7)	0,469**
Working mother	14(46,6)	10(33,3)	10(33,3)	
Education, f(%)				
Elementary School	2(6,7)	3(10)	3(10)	
Junior High School	7(23,3)	2(6,7)	6(20)	0,474**
Senior High School or over	21(70)	25(83,3)	21(70)	

*Kruskal Wallis **Chi Square

Table 2. PUQE Score Distribution Before and After Aromatherapy

Measurement	Ginger	Lemon	Placebo	P value
	Mean ± SD	Mean ± SD	Mean ± SD	
Before	7,67 ± 2,304	7,16±1,598	6,70±1,787	0,001*
After	6,85±1,575	5,50±1,448	5,50±1,803	0,012*
P value	0,000**	0,000**	0,002**	
Score difference of PUQE	1,67±1,083	1,33±1,447	0,81±1,502	0,028

Table 3. Duration and Frequency of Nausea and Vomiting and Frequency of Dry Vomiting from Day 1-7

Variable & Group	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Nausea and vomiting duration							
Ginger	3,07±1,048	3,00±1,017	3,07±0,980	3,00±0,830	2,73±0,640	2,60±0,621	1,73±0,907
Lemon	2,03±3,589	2,40±1,003	2,43±1,104	2,00±1,050	1,97±0,999	1,67±0,959	1,70±0,877
Placebo	1,80±0,847	2,13±1,167	2,07±1,230	1,83±1,117	1,73±1,081	1,63±0,964	1,57±1,006
Kruskal Wallis test	0,000	0,003	0,001	0,000	0,000	0,000	0,527
Nausea and Vomiting Frequency							
Ginger	3.07±1,143	2,97±0,999	2,93±0,944	2,90±0,845	2,47±0,681	2,20±0,484	1,70±0,794
Lemon	2,63±0,718	2,67±0,844	2,50±0,630	2,37±0,890	2,23±0,728	2,03±0,765	1,63±0,765
Placebo	2,37±0,850	2,27±0,868	2,03±0,765	2,20±0,761	2,17±0,747	2,10±0,712	1,80±0,714
Kruskal Wallis test	0,046	0,023	0,001	0,004	0,163	0,451	0,539
Dry Vomiting Frequency							
Ginger	2.73±1,143	2,73±1,285	2,77±0,898	2,53±0,730	2,20±0,761	1,90±0.885	1,43±0,679
Lemon	2,70±0,877	2,60±0,932	2,70±0,988	2,33±0,922	2,00±0,587	1,87±0,681	1,63±0,669
Placebo	2,47±1,042	2,47±1.106	2,50±1,042	2,40±1,037	2,17±0,874	2,03±0,765	1,90±0,712
Kruskal Wallis test	0,653	0,719	0,621	0,635	0,639	0,622	0,010

DISCUSSION

Nausea and vomiting or often called as emesis is one of the complaints most often experienced by pregnant women. The case is about 50-80% (Lacasse et al., 2008). The cause of nausea and vomiting is still relatively unknown. Some occur because there are hormonal changes, where estrogen levels are increased (Pillitteri, 2010). This condition can last a long time and affects the physical, psychological and social conditions of pregnant women (Lacasse et al., 2008; Munch et al., 2011). Pregnant women can experience lack of energy, fatigue; irritability, anxiety and even become dehydrated as a result of nausea and vomiting during pregnancy (Beyazit & Sahin, 2018; Heitmann, 2017).

This study showed that ginger aromatherapy can reduce the duration of nausea and vomiting, the frequency of dry nausea and vomiting starts from day 4 to 7 compared to placebo. Farzaneh et al. (2013) found that the aromatherapy using ginger was able to reduce nausea and vomiting around 52% and 48%. This percentage was lower than those in Ensiyeh's (2009), which found that it was able to reduce vomiting up to 82.8%.

Aromatherapy can stimulate physiological and psychological responses. When inhaling aromatherapy, the substance secretes molecules, and then receptor cells in nose send impulses directly to olfactory nerve in the brain. These impulses react and release hormones that stimulate, calm and improve mood which leads to better physical and psychological responses (Pillitteri, 2010; Dvivedi, Dvivedi, Mahajan, Mittal, & Singhal, 2008).

Ginger aromatherapy was found to reduce nausea and vomiting up around 43.6%. Ginger blocks serotonin receptor and induced antiemetic effect in gastrointestinal and central nervous systems (Wiraharja Heidy, Rustam, & Iskandar, 2011). This condition explains why ginger could reduce nausea and vomits in pregnancy.

The phytochemicals compound of ginger such as *gingero*l, *shogaol* and *zingerone* provide pharmacological and physiological effects such as antioxidant, anti-inflammatory, analgesic, anti-carcinogenic, non-toxic, and non-mutagenic. Ginger oleoresin contains fat, wax, carbohydrates, vitamins, and minerals. Oleoresin provides spicy aroma that ranges from 4% -7% and is a source of antioxidants (Kim et al., 2011). Ginger also contains atsiri oil that functions as anti-inflammation. Ginger can reduce the frequency of nausea and vomitus caused by inflammation related to H. pylori infection.

Lemon's aroma therapy was also found to be effective in reducing symptoms of nausea and vomiting around 39.6%. Previous study found that lemon essential oil was an alternative non-pharmacological treatment that effectively reduces nausea and vomiting in pregnant women (Parisa et al., 2014). Aromatherapy using peppermint was found to be not effective to treat nausea and vomiting. This might be due to the small number of samples (Pasha et al., 2012). The placebo group was not effective in reducing nausea and vomiting, which contained almond oil. Changes in the symptoms of nausea in the placebo group were subjective and based on the suggestion of pregnant women themselves.

When pregnant women received aromatherapy from day 4-7, their responses varies. Some did not like the smell. Others stated that the fragrance was less strong but it reduced nausea. The limitation of this study is psychological conditions of pregnant women when inhaling aroma therapy was not considered.

CONCLUSION

Aromatherapy using ginger and lemon essential oils is equally effective in treating nausea and vomiting in pregnant women. The products can be used to minimize the severity of nausea episodes. Nurses can use this type of therapy to treat NVP.

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