A randomized controlled trial of combination of peppermint, lavender, and turmeric oil for antipruritic agent in pregnant women

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ABSTRACT

BACKGROUND Pruritus is the most common dermatological complaint that occurs during pregnancy, which is around 14–20%. No research related to herbal products to reduce some of the characteristics of pruritus at once has been conducted. This study aimed to assess the effect of blending oil to reduce pruritus based on visual analog scale (VAS).

METHODS This was a single-blind, randomized clinical trial that included 57 pregnant women who were at 25–38 weeks of gestation, had a pruritus during pregnancy, a single pregnancy, a level I and II pruritus and a moderate to severe pruritus based on VAS. Pruritus scores were measured using VAS in both the treatment and control groups. The treatment and control groups applied blending oil and placebo, respectively, twice a day after bathing for 2 weeks. Mann–Whitney *U*, paired *t*, and chi-square tests were used for the analysis.

RESULTS Pruritus reduction in pregnant women who received blending oil was higher than those using placebo (61.08% *versus* 12.41%, $p<0.05$). 83% of subjects using blending oils had a reduction of pruritus by >25 mm. Pregnant women who used placebo had a six times greater risk of experiencing pruritus than those who used blending oil (RR = 5.8, 95% CI = 2.613–12.874).

CONCLUSIONS Blending oil can be used topically to treat a pruritus in pregnant women.

KEYWORDS essential oils, lavender, peppermint, pregnancy, pruritus, turmeric

According to the International Forum for the Study of Itch, pruritus is an irritating skin sensation and characterized by itch and stimulation to scratch.[1] It is also the most common dermatological complaint occurs during pregnancy, which is around 14–20%. Pruritus occurs, on average, at 25–38 weeks of gestation and is mostly found in the abdomen, chest, or breasts, followed by the hands and feet. The cause of pruritus in pregnancy is not yet fully understood, but it is thought to be mediated by changes in physiological adaptation and disruption of the cortisol hormone circadian rhythm that is triggered by maternal stress during pregnancy.[2–4] Pruritus makes pregnant women feel irritated and worried because of itching which affects their sleep quality and productivity, thereby reducing their quality of life (QoL).[4,5]

The pruritus treatment in pregnancy is manly focused on reducing prutitus symptoms, which includes topical therapy.[1] Based on surveys in the West, the prevalent use of herbal medicines in pregnancy

ranges from 1% to 60%. During pregnancy, women mostly prefer to use herbal medicines that are believed to be more natural and safer than chemical drugs.[6]

Blending oils (peppermint oil, lavender essential oil [LEO], and essential turmeric oil [ETO]) is an herbal oil product that is easy to use; easily absorbed by the skin; contains menthol, linalool, and ar-turmerone; and functions as an antipruritic, antiseptic, anti-inflammatory, anesthetic, antioxidant, and wound-healing agent. Several studies showed that menthol in peppermint oil had a cooling effect on the skin, thereby reducing the itching caused by histamine through the activation of A nerve fibers and κ-opioid receptors.[7,8] Linalool, a compound in LEO, is an effective anti-inflammatory agent that reduce degranulation of mast cells and thicken the epidermal layer and has anesthetic, antioxidant, and wound-healing properties.[9,10] Ar-turmerone, a compound in ETO that has a molecular group similar to curcumin, has efficacy as an antipruritic, anti-inflammatory, antiseptic, and antioxidant agent.[11,12]

The characteristics of pruritus vary in pregnancy from itch, dryness, and scaling to redness, pain due to scratching, and primary lesion presence. A study showed that 0.5% of peppermint oil can be consumed for the symptomatic treatment of skin itching on pregnant women and did not cause any special side effects.[13] Based on its benefits, peppermint oil only reduces itching. Currently, there was no study on herbal products in reducing some characteristics of pruritus simultaneously. Hence, this study aimed to reveal the effect of blending oil to reduce pruritus in pregnant women.

METHODS

This study began with the manufacture of a blending oils formula, which is a mixture of peppermint oil, LEO, ETO, and virgin coconut oil (VCO).[13] PT Nusaroma Essential Indonesia prepared the essential oils by using steam distillation method. Peppermint oil was made from leaf peppermint (*Mentha piperita*) from the United States,[7] lavender oil from lavender flowers (*Lavandula angustifolia*) from France,[9] and turmeric oil from domestic *Curcuma* rhizomes from Indonesia.[11,12] VCO was produced by CV Aji Saka Kelapa using the cold press and centrifuge method. The quality of essential oils and VCO was assessed based on the results of the gas chromatography test as indicated in the certificate of analysis sheet.

Blending oils was mixed at a ratio of 1:1:1, namely, peppermint oil 1%, LEO 1%, and ETO 1% with VCO as a carrier oil. Apart from being a carrier oil, VCO was also used as a placebo in this study. Blending oil and placebo were prepared in 30-ml dark glass bottles. Each bottle had a code but packed similarly. The code prepared by the researcher to identify blending oil or placebo, but only the researchers and enumerators were aware of the code. The treatment group had blending oil, meanwhile the control group had placebo (VCO). Subjects in both groups applied the oil twice a day after taking a bath for 2 weeks. The amount of oil varied depending on the surface area of the pruritic (itchy) skin. The researchers only asked to limit the application frequency and not the volume.

This single-blind, randomized clinical trial was conducted in five primary healthcare facilities in Surabaya from September to November 2019. The study was conducted after the approval of the Research Ethics Committee of the Faculty of Medicine Universitas Padjadjaran (No: 1189/UN6.KEP/EC/2019) and written informed consent was obtained from every patient.

The sample size was determined based on the sample size formula for the two groups with independent numerical data. The 95% confidence interval of the two-way hypothesis ($Z\alpha = 1.96$) and the 90% power test ($Z\beta = 1.28$) were defined, and the standard deviation and effect size were 2.5.[13] A total of 42 subjects were calculated for samples, but 50% of each group was added to 30 subjects per group. Subjects were recruited consecutively and were allocated with block randomization which was performed individually and sequentially. Every four subjects in a row will be divided into two equal sizes. Randomization was carried out by enumerators and unknown to the subject (single-blind).

Participants

The inclusion criteria of the participants were 25–38 weeks of gestation, had pruritus during pregnancy, single pregnancy, level I and II pruritus, moderate to severe pruritus based on visual analog scale (VAS), and agreed to participate in the study. Participants with an allergy history before pregnancy and an allergy with blending oil based on a simple sensitivity test were excluded. Furthermore, the dropout criteria included patients who did not apply the blending oil twice a day for a 14-days application as recommended

blending oil, had worsened pruritus, and quit during the research process.

Measurements

In this study, VAS was used to measure pruritus scores of the treatment and control groups. VAS is a graphical tool with 100 mm (10 cm) horizontal lines with the left and right ends marked as "without symptoms of pruritus" and "the worst imaginable pruritus symptom," respectively. The subjects were asked to mark on the horizontal line by drawing a vertical line (0–100 mm) to show the intensity of symptoms at the beginning of the examination and after 14 days of using blending oil. The length from the left end to the vertical mark made by the patient was measured in millimeters. Prutitus reduction was determined by the result of the VAS scores of the two groups at the beginning of the examination and after 14 days of using the oil. The VAS score reduction was classified according to cut points (≤25 and >25 mm). A decrease of >25 mm in VAS score indicates the efficacy to reduce pruritus.[13]

Data were processed using SPSS software version 20 (IBM Corp., USA). Between-group comparisons were performed using the Mann–Whitney *U* or paired *t*-tests (for continuous variables) and chi-square or Fischer's exact tests (for categorical variables). A *p*-value of <0.05 was considered statistically significant.

RESULTS

The flow of the study participants were presented in Figure 1. There were only three subjects who lost to follow-up. The characteristics of the subjects between

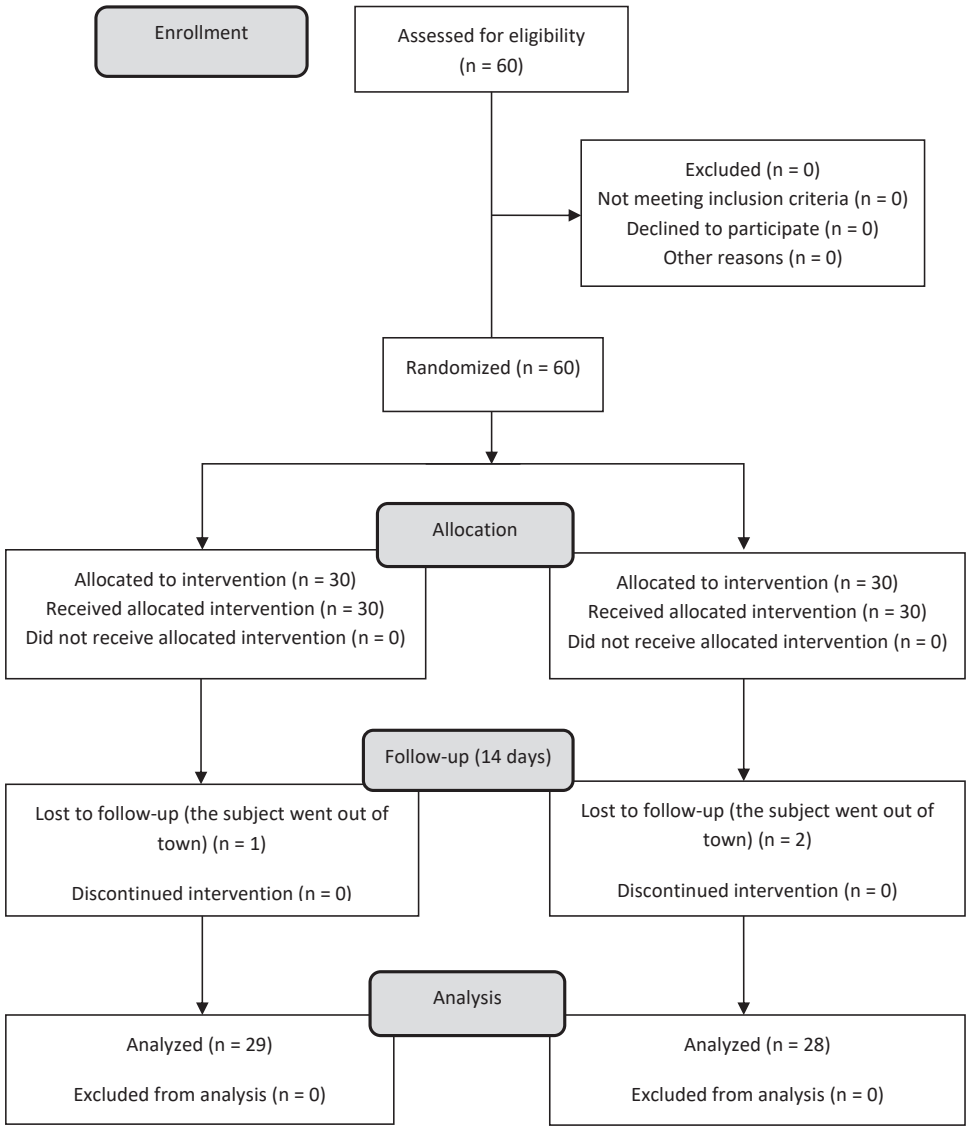

Figure 1. Flowchart of the study participants

the two groups are shown in Table 1. There was no difference in the subjects' characteristics between the treatment and control groups; therefore, both groups were comparable. Table 2 shows a difference of the pruritus reduction between the two groups.

Table 3 shows 83% of using blending oils (peppermint oil, LEO, and ETO) had a reduction of pruritus by >25 mm. Pregnant women who did not use blending oil had a six times greater risk of experiencing pruritus than those who used blending oil. Moreover, there were no complaints of dry skin in all subjects who used blending oil for 14 days. None of the pregnant women who received placebo had a VAS score of >25 mm, or in other words, the pruritus complaints did not decrease. However, VCO had also no adverse effect on pruritus skin.

Table 1. Characteristics of subjects in both groups

Characteristic	Group	
	Treatment, n (%) (N = 29)	Control, n (%) (N = 28)
Age (years)		
<20	1 (4)	3 (11)
20–35	25 (86)	25 (89)
>35	3 (10)	0 (0)
Gravid		
Primigravida	17 (59)	14 (50)
Multigravida	12 (41)	14 (50)
Age of pregnancy (weeks)		
Trimester II (13–27)	3 (10)	5 (18)
Trimester III (28–38)	26 (90)	23 (82)
Education		
Elementary school to junior high school	6 (21)	4 (14)
High school	17 (58)	16 (57)
College	6 (21)	8 (29)
Job		
Employed	12 (41)	14 (50)
Unemployed	17 (59)	14 (50)
Area of pruritus*		
Abdomen	17	15
Breast folds	10	9
Chest	5	6
Neck	4	3
Hands	7	9
Feet	6	9
Characteristic of pruritus*		
Primary lessions	5	3
Rashes or inflammation	9	5
Dryness	17	15
Roughness	11	7
Scaliness	10	8
Pain (scratcing impact)	19	21

*Some patients had more than one area or characteristic of pruritus

Table 2. Pruritus (VAS) in the treatment and control group

Pruritus	VAS (baseline) (mm), mean (SD)	VAS (after) (mm), mean (SD)	*p*
Treatment (n = 29)	62.7 (13.55)	22.4 (12.5)	**<0.001***
Control (n = 28)	57.2 (10.75)	55.0 (9.47)	0.228*
p	**<0.001**†	0.068†	

SD=standard deviation; VAS=visual analog scale
*Mann–Whitney *U* test; †paired *t*-test

Table 3. Efficacy of blending oil in pregnant women with pruritus after 14 days application

Group	Pruritus reduction (mm, VAS score)		*p**	RR (95% CI)
	≤25	>25		
Control (n = 28)	28 (100%)	0 (0%)	**<0.001**	5.8 (2.613–12.874)
Treatment (n = 29)	5 (17%)	24 (83%)		

CI=confidence interval; RR=relative risk; VAS=visual analog scale
*Fisher's exact test

DISCUSSION

In this study, pruritus was commonly occurred in the abdomen, breast folds, chest, neck, hands, and feet. In addition, the characteristics of pruritus include primary lesions, rashes or inflammation, dryness, roughness, scaliness, and pain. Intense inching also affects the sleep quality of pregnant women.

The decreased productivity and QoL of pregnant women due to pruritus could be prevented if safe symptomatic treatment principles are applied. The results of this study indicate that the severity of pruritus after the use of blending oil reduced significantly compared to placebo ($p<0.001$). In addition, the VAS score of pregnant women taking blending oil significantly decreased from 62.7 mm to 22.4 mm. This result agrees with the research conducted by Amjadi et al[13] that the VAS score in pruritic pregnant women

who were given topical peppermint oil with sesame oil as a carrier oil twice daily for 14 days decreased from 57.6 mm to 10.6 mm (p<0.05).

Peppermint, which is a terpenoid organic compound that has a cooling effect on the skin, reduces itching caused by histamine through the activation of A nerve fibers and κ-opioid receptors. However, the long-term use of peppermint oil can trigger dry skin, which causes recurring itching.[8] In this study, the use of blending oil for 14 days showed no complaints of dry skin. This is due to the use of VCO as a carrier oil in blending oil, which is also used as a moisturizer and skin barrier repair to prevent dry skin. VCO contains medium-chain fatty acids that can reduce cell inflammation through the penetration of the dermis layer by changing the lipase reaction from skin flora to free fatty acids so that it coats the skin (skin barrier), accelerates a wound healing, and reduces the pruritus nature and characteristics.[14,15] The active ingredient in blending oil has been proven to reduce pruritus by working on the mast cell degranulation process, removing pruritogenic mediators, stimulating nerve endings, coating or protecting the skin, and improving pruritic skin characteristics.[1,16]

A study compared ciprofloxacin and lamigex (combination of *Syzygium aromaticum*, *Lavandula angustifolia*, and *Geranium robertianum* essential oils) for treating acute external otitis symptoms (tenderness, itching, erythema, edema, and discharge) and found that lamigex exhibited good efficacy in reducing the burden of infection and acute external otitis symptoms including itching. Linalool is among the active components of LEO, which is responsible for its antimicrobial and antifungal properties.[17]

Besides itching, pregnant women with pruritus also experience redness and pain due to scratched wounds. Linalool is useful as an anti-inflammatory agent by reducing the degranulation of mast cells and thickening of the epidermal layer and is an anesthetic, antioxidant, and wound-healing agent.[9,10] There is no study related to the benefits of LEO for treating itching in pregnancy. A randomized control trial of 120 women stated that LEO was effective in reducing pain and redness in episiotomy wounds as indicated by a reduction in redness, edema, ecchymosis, discharge, and approximation score, and the VAS score reduced more significant in the treatment group than in the control group.[18]

ETO contains curcumin-like active molecular compounds, which have anti-inflammatory properties in edema.[19] Kumar et al[20] revealed that ETO from turmeric leaf waste has anti-inflammatory properties in the skin of inflamed mice. Topical use of ETO can reduce ear edema and improve proinflammatory cytokines (tumor necrosis factor-α, interleukin [IL]-6, and IL-1β) at the protein and mRNA levels. The various benefits of ETO are caused by the activity of ar-turmerone as the main component. Ar-turmerone has an antiplatelet aggregation activity *in vitro* and antimutagenic, anti-inflammatory, antibacterial, and antifungal properties. As an anti-inflammatory compound, ar-turmerone suppresses the production of inflammatory cytokines by inhibiting cyclooxygenase-2 release.[19]

Blending oils with appropriate doses of essential oils (peppermint oil, ETO, and LEO) are used topically and considered safe for pregnant women. In this study, using blending oil twice after bathing for 14 days on pruritic skin does not have harmful effects such as allergies or dryness. However, people who have previously been allergic to oils or have a sensitive skin may need to be aware of the risk of allergies. A simple sensitivity test can be performed before using blending oil by rubbing it on the skin of the ear, arm folds, or inside wrist part (a very sensitive part), marking the area, and then leaving it uncovered for 24 hours. If no redness or itchy marks are noted, blending oil does not cause allergies.[1,21]

This study has several limitations. First, VAS measurements were only performed twice (before treatment and 14 days after treatment) and reported subjectively. The results thus did not reflect changes in any specific or objective pruritus characteristics. Second, monitoring the compliance of the research subjects in using blending oil is limited to the use of a messaging application for smartphones. In addition, the use of other medications was possible during the 14 days of treatment (especially in the control group). Future recommendations are necessary, and further studies should employ different communities, larger sample sizes, objective measuring instruments, and better monitoring of blending oil usage.

In conclusion, blending oil can be used as a topical symptomatic therapy of pruritus in pregnancy. Blending oil has no special adverse effects in pregnant women, suggesting that it may still have a potential effect in improving poor sleep quality and increasing productivity and QoL in pregnant women with pruritus.

Conflict of Interest

The authors affirm no conflict of interest in this study.

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