

DOI: <http://dx.doi.org/10.33846/hn71004>  
<http://heanoti.com/index.php/hn>



## RESEARCH ARTICLE

URL of this article: <http://heanoti.com/index.php/hn/article/view/hn71004>

# The Effectiveness of Foot Massage with Kencur Oil and Soak Warm Water Mixed with Kencur Rhizomes Against Foot Oedema in Third Trimester Pregnant Women at the Independent Practice of Midwives of Simalungun Regency

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## ABSTRACT

Leg oedema is found in 80% of pregnant women in the third trimester, occurs due to uterine pressure that blocks venous backflow and gravitational pull, causing feelings of heaviness and cramps. The purpose of the study was to determine the effectiveness of the comparison of foot massage with kencur oil and warm water soak of a mixture of kencur rhizomes against foot oedema in third trimester pregnant women in the independent practice of midwives of Simalungun Regency. Types of quasi-experimental research (pretest and posttest group). Consecutive sampling technique, the number of samples of 48 people, divided into two groups of 24 respondents each. Pretest: initial foot oedema examination, foot massage intervention with kencur oil and warm water soak with kencur rhizomes for 5 days, post test: foot oedema examination after intervention. Data analysis using the Mann Whitney and Willcoxon test. There was a difference in mean leg edema before and after the intervention between the two groups, namely in MPJ circumference ( $p < 0.05$ ). There was no difference in mean leg edema and length of return time before and after the intervention of the two groups with a  $p$ -value of  $> 0.05$  value. There were differences in mean leg edema and length of return time before and after intervention in each group with  $p$ -value of  $> 0.05$  values. As conclusion, foot massage with kencur oil is effective to reduce oedema and discomfort during pregnancy.

**Keywords:** kencur oil; kencur rhizome; foot oedema; pregnancy

## INTRODUCTION

Changes that occur during pregnancy require a process of adaptation both physical and psychological. This adaptation process can result in physiological and pathological discomfort. Discomfort during pregnancy includes nausea, vomiting, ptialism, fatigue, upper back pain, leukorea, increased urination frequency, heartburn, flatulent, uterine ligament, lower back pain, hyperventilation, tingling, supine hypotension syndrome and leg edema.<sup>(1)</sup> Leg oedema or swelling of the legs is found in about 80% of pregnant women in the third trimester, occurs as a result of uterine pressure that inhibits venous backflow and gravitational pull causes greater fluid retention. Physiological leg oedema causes discomfort, feelings of heaviness, and cramps at night.<sup>(2)</sup> The most common symptoms of leg oedema are the experience of substantial pain, as well as nighttime cramps, numbness and tingling.<sup>(3)</sup> Oedema in the legs is usually complained of at 34 weeks gestation. This is because uterine pressure is increasing and affects fluid circulation, with increasing uterine pressure and gravitational pull causing greater fluid retention.<sup>(1)</sup> Natural foot soak therapy (foot hydrotherapy) helps improve blood circulation by widening blood vessels so that more oxygen is supplied to tissues that reduce swelling.<sup>(4)</sup> Warm water foot soak is a condition of feet that are in direct contact with warm water. Warm water foot soak is carried out at a temperature of 38-39 °C.<sup>(5)</sup> From the results of the literature review of six journal articles can be combined and analyzed that intervention on leg edema in pregnant women as a non-pharmacological treatment or naturally using foot massage and warm water soak mixed with kencur in the category of interventions that are safe and effective enough to reduce foot oedema of pregnant women who do not get pharmacological treatment.<sup>(6)</sup> Using oil during foot massage helps the

hands move easily on the skin, causing the skin to become moisturized.<sup>(3)</sup> Kencur is efficacious as a medicine for cough, itching in the throat, flatulence, nausea, colds, aches, swelling/inflammation compresses, tetanus and appetite enhancers.<sup>(7)</sup> The oil content of kencur rhizomes consists of miscellaneous compounds (e.g. ethyl p-methoxycinnamate 58.47%, isobutyl  $\beta$ -2furilactylate 30.90%, and hexyl format 4.78%); oxygenated monoterpene derivatives (e.g. borneol 0.03% and camper hydrate 0.83%); and hydrocarbon monoterpenes (e.g. kamfen 0.04% and terpinolen 0.02%).<sup>(8)</sup> The results of the literature review on the article found that respondents felt more comfortable because the leg edema experienced could be reduced after getting a foot massage with 20 minutes for 5 days in leg edema.<sup>(6)</sup> Foot massage can provide a relaxing stimulus to the reticular activating system, working as an alert system located in the upper brain stem will decrease and be diverted to the bulbar synchronizing region (BSR), releasing serotonin which can provide sleepiness effects.<sup>(9)</sup> Based on a preliminary survey of 54 students of the Pematangsiantar Midwifery Study Program, there were 54 third trimester pregnant women who carried out Ante Natal Care (ANC) examinations at the Midwife Clinical Practice. Of the 54 pregnant women, 46 were obtained in the third trimester with physiological leg oedema.

The purpose of this study was to determine the effectiveness of foot massage with kencur oil and soak warm water mixed with kencur rhizomes against foot oedema in III trimester pregnant women.

## METHODS

This research was included in the type of quasi experiment with pretest and posttest group design. This research was conducted at the Midwife Independent Practice of Simalungun Regency. The study was conducted from April to September 2020. Conducted on 48 III trimester pregnant women who met the inclusion and exclusion criteria. The sampling method in this study was carried out by non-probability sampling, namely by consecutive sampling.

At the beginning of the study, foot oedema examination was carried out in both groups of III trimester pregnant women, then joint treatment was carried out in group I foot massage with kencur oil for 20 minutes on both foot stalks. Then in group II soaked the feet of pregnant women using warm water with a temperature of 38-39 °C (3 liters) mixed with kencur rhizomes as much as 1 ounce soaked for 15 minutes, each carried out for 5 days. Then looked at foot oedema from each group after foot massage and foot soak and statistically analyzed in pregnant women in the third trimester of group I and group II. Data were analyzed descriptively in the form of mean and standard deviation, then followed by Mann-Whitney test to analyze differences in instep circumference of foot oedema between the foot massage group with loose oil and foot soak with warm water and Wilcoxon test to analyze differences in instep circumference and return of leg oedema before and after treatment.

## RESULTS

Tables 1 to 4 show that basically both methods, both foot massage and foot soak, are equally effective in reducing edema in pregnant women in various body regions. It does appear that the effect of foot massage is more significant, however, both methods are successful in reducing edema. Thus, it can be interpreted that both methods are good choices for reducing edema in pregnant women.

Table 1. Mean differences in leg oedema before and after the intervention between the two groups (Mann-Whitney test)

| Variable          | Group                  |                | p-value |
|-------------------|------------------------|----------------|---------|
|                   | Foot massage (Mean+SD) | Soak (Mean+SD) |         |
| Pre intervention: |                        |                |         |
| - Ankle           | 24.46±1.38             | 23.58±1.28     | 0.014   |
| - Instep          | 24.79±0.78             | 24.33±1.24     | 0.119   |
| - MPJ             | 23.79±0.98             | 22.83±1.34     | 0.003   |
| Fifth day:        |                        |                |         |
| - Ankle           | 23.25±1.36             | 22.92±1.50     | 0.185   |
| - Instep          | 23.42±0.83             | 23.04±1.46     | 0.087   |
| - MPJ             | 23.29±0.86             | 22.33±1.61     | 0.004   |

Table 2. Differences in the mean length of time for the return of oedema before and after the intervention between the two groups (Mann-Whitney test)

| Duration of return of oedema (seconds) | Group                  |                | p-value |
|--|------------------------|----------------|---------|
|  | Foot massage (Mean+SD) | Soak (Mean+SD) |         |
| Pre intervention                       | 4.50±1.59              | 3.63±1.71      | 0.106   |
| Fifth day                              | 0.88±0.99              | 1.17±1.61      | 1.000   |

Table 3. Differences in mean foot oedema and length of time for return of oedema before and after intervention in the foot massage group (Wilcoxon test)

| Variable                      | Group                      |                     | p-value |
|-------------------------------|----------------------------|---------------------|---------|
|                               | Pre intervention (Mean+SD) | Fifth day (Mean+SD) |         |
| Oedema of the legs::          |                            |                     |         |
| - Ankle                       | 24.46±1.38                 | 23.25±1.36          | 0.000   |
| - Instep                      | 24.79±0.78                 | 23.42±0.83          | 0.000   |
| - MPJ                         | 23.79±0.98                 | 23.29±0.86          | 0.001   |
| Long time of return of oedema | 4.50±1.59                  | 0.88±0.99           | 0.000   |

Table 4. Differences in mean leg oedema and return of oedema before and after intervention in the foot soak group (Wilcoxon test)

| Variable                      | Group                      |                     | p-value |
|-------------------------------|----------------------------|---------------------|---------|
|                               | Pre intervention (Mean+SD) | Fifth day (Mean+SD) |         |
| Oedema of the legs::          |                            |                     |         |
| - Ankle                       | 23.58±1.28                 | 22.92±1.50          | 0.001   |
| - Instep                      | 24.33±1.24                 | 23.04±1.46          | 0.000   |
| - MPJ                         | 22.83±1.34                 | 22.33±1.61          | 0.007   |
| Long time of return of oedema | 3.63±1.71                  | 1.17±1.61           | 0.000   |

## DISCUSSION

In the foot massage group, the average difference in foot edema was lower after the intervention of 5 days each, namely ankle (0.55 mm); instep (0.08 mm) and MPJ (0 mm). In this study, foot massage succeeded in reducing foot oedema in III trimester pregnant women. The results of statistical tests showed that there was a difference between the two groups after the intervention only at MPJ ( $p = 0.004$ ). This is in line with the research of Navaee & Rakhshkhorshid, 2020 and Rahimikian et al, 2015 which states that there are differences in the intervention and control groups before and after the intervention in terms of the mean circumference of the ankle, instep, and MP joints for both feet. It's just that this study only measured leg oedema in the right leg only and there was no control group.<sup>(3,10)</sup>

Foot massage is one intervention to reduce physiological edema in pregnancy that works by applying pressure to the edematous area. By giving foot massage to the lower extremities of pregnant women, fluid movement is expected in the area that has edema. Foot massage is able to improve blood work in the process of transporting nutrients and oxygen throughout the body, so as to reduce edema and improve fluid circulation in the body.<sup>(11)</sup>

According to researchers, the difference only in MPJ can be caused because the massage is done on the instep of the foot which is directed upwards, and from the MP joint leads to the instep then directs the massage upwards to further facilitate blood circulation behind the veins besides also parallel to the position of the heart causing a difference. This is in line with the research of David C. Dugdale (2013) in Khedr H.F.N and Hemida R, (2016) which states that most of the time swelling can be reduced by elevating the legs above the height of the heart.<sup>(12)</sup>

There was no difference in the length of return of leg oedema before and after the intervention in both groups. This is because at the time of the same intervention using kencur. It's just that the foot soak uses kencur rhizomes while foot massage uses kencur oil. The largest component contained in kencur oil is ethyl para metoxynamate. Kencur oil can be produced from kencur rhizomes (*Kempferia Galanga L.*) which have been made into kencur powder by maceration method using solvents.<sup>(13)</sup>

The length of time of return of oedema before and after the intervention in both groups was equally higher in foot massage. Before the intervention was 0.87 seconds, while after the intervention 5 days was 0.29 seconds. The frequency of time for 20 minutes is proven effective to reduce swelling in pregnant women because touch or rubbing or repeated massage will cause an increase in temperature in the massage area that is done will stimulate the nerve sensors of the legs so that vasodilation of blood vessels and lymph that affects blood flow increases, blood circulation is smooth, reduces swelling and can mobilize muscle fibers, tendons with the skin, and cause a relaxation effect.<sup>(9)</sup>

In the foot massage group, the average foot edema was higher before the intervention, respectively, ankle (1.21 mm); instep (1.37 mm) and MPJ (0.5 mm). The results of statistical tests showed differences in foot oedema before and after the intervention in the foot massage group.

Studies of historical documents show massage is one of the oldest physical therapies that have been used by humans. Massaging helps restore venous blood flow pumping action caused by muscle compression, can lead

to a reduction in edema of the lower extremities. So it is better to use effective oils to increase the impact of massage to reduce more the amount of edema in a shorter time.<sup>(3)</sup>

Research Navaee & Rakhshkhorshid, 2020 states grape seeds and sweet almond oil are very effective in reducing edema. Sweet almond oil and grape seed oil are rich in vitamin E, B vitamins, amino acids, and flavonoids which with their powerful antioxidant properties result in repair of damaged vessels and improve environmental blood flow. In this study using kencur oil which also has flavonoid compounds as antiinflammatory.<sup>(14)</sup>

The scent of kencur as will be captured nasal receptors which then stimulate to the brain which controls and relates to feelings (mood and emotions) then channeled to the hypothalamus as a regulator of the body's internal system, body temperature control system, and blood flow control system. The aroma effect of kencur will provide calm, comfort, reduce pain and stress, and provide relaxation.<sup>(15)</sup>

In the foot massage group, the length of time for the return of foot oedema was higher before the intervention at 3.62 seconds and the results of statistical tests showed that there was a difference in the length of return time of oedema before and after the intervention in the foot massage group ( $p = 0.000$ ). The results are in line with Navaee & Rakhshkhorshid's 2020 study, which showed significant differences in the intervention and control groups before and after the intervention in terms of the average circumference of the ankle, instep, and MP joints for both feet, only in this study did not measure the length of time the return of oedema before and after foot massage.<sup>(3)</sup>

This study was the same as doing foot massage using oil for five consecutive days both before and after foot massage in pregnant women. And the results of the study Navaee & Rakhshkhorshid, 2020 state that the more effective the oil used in massage, the greater the reduction of discomfort and reduction of edema. The difference is that the two studies were the same using the same control group and measuring left and right leg oedema on the circumference of the ankle, instep and MPJ before and after the action, while the researchers did not use the control group and only measured the oedema of the right leg only on the circumference of the ankle, instep and MPJ.<sup>(3)</sup>

In the foot soak group, the average leg edema was higher before the intervention, respectively, namely ankles (0.66 mm); instep (1.29 mm) and MPJ (0.5 mm). The results of statistical tests showed differences in foot oedema before and after the intervention in the foot soak group ( $p < 0.05$ ). In the foot soak group, the length of time for the return of foot oedema was higher before the intervention was 2.46 seconds and the results of statistical tests showed that there was a difference in the length of return time for oedema before and after the intervention in the foot soak group ( $p = 0.000$ ).

This is in line with the research of Khedr H.F.N and Hemida R, 2016, which states that immersion in water has a positive effect in reducing the degree of leg edema compared to leg elevation in pregnant women in the third trimester. This study was the same as no control group, the difference was only in this study measuring the length of return of oedema before and after the procedure and measuring leg oedema in the circumference of ankle, instep and MJP in the foot massage and foot soak groups, while in the study Khedr H.F.N and Hemida R, 2016 only measured foot oedema by grouping foot oedema degrees 1-4.<sup>(12)</sup>

Water therapy has been used to produce different therapeutic physiological effects in pregnant women in different parts of the health containment system, prevention, and treatment of disease. Water pressure is applied uniformly from all sides and moves extravascular fluid into the intravascular space, resulting in an increase in central blood volume that can lead to increased uterine blood flow. The increase in blood volume is comparable to female edema.<sup>(12)</sup> It also reduces the effects of gravity, facilitates heat dissipation, and supports a pregnant uterus.<sup>(12)</sup>

In the use of warm water soak can be combined to more effectively reduce leg edema, namely by curring. The content in kencur has chemical compounds that can reduce edema or inflammation. Chemical compounds in kencur rhizomes that have anti-inflammatory effects are plavonoids, which can reduce edema or inflammation. The greater the dose used, the greater the effect for anti-inflammatory. Kencur rhizomes as anti-inflammatory can inhibit the release of serotonin and can inhibit prostaglandin synthesis from arachidonic acid by inhibiting the work of cyclooxygenase.<sup>(14,16-21)</sup>

## CONCLUSION

Based on results, foot massage with kencur oil is effective to reduce oedema and discomfort during pregnancy.

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