Effect of foot massage to decrease physiological lower leg oedema in late pregnancy: A randomized controlled trial in Turkey

Ayden Çoban RN PhD
Assistant Professor, Department of Midwifery, Aydın School of Health, Adnan Menderes University, Aydın, Turkey

Ahsen Şirin PhD
Professor, Department of Obstetric and Gynecologic Nursing, Nursing School, Ege University, Ege, Turkey

Accepted for publication February 2010

Çoban A, Şirin A. International Journal of Nursing Practice 2010; 16: 454–460

Effect of foot massage to decrease physiological lower leg oedema in late pregnancy: A randomized controlled trial in Turkey

This study aims to evaluate the effect of foot massage for decreasing physiological lower leg oedema in late pregnancy. Eighty pregnant women were randomly divided into two groups; study group had a 20 min foot massage daily for 5 days whereas the control group did not receive any intervention beyond standard prenatal care. The research was conducted between March and August 2007 in Manisa Province Health Ministry Central Primary Health Care Clinic 1, in Manisa, Western Turkey. Compared with the control group, women in the experimental group had a significantly smaller lower leg circumference (right and left, ankle, instep and metatarsal–phalanges joint) after 5 days of massage. The results obtained from our research show that foot massage was found to have a positive effect on decreasing normal physiological lower leg oedema in late pregnancy.

Key words: foot massage, lower leg oedema, pregnancy, randomized controlled trial.

INTRODUCTION

Physiological lower leg oedema is found in about 80% of all pregnancies, occurring in late pregnancy.1–5 It occurs as a result of the pressure of the gravid uterus, which impedes venous return; prostaglandin-induced vascular relaxation; and reduced plasma colloid osmotic pressure.3,4,6 Dependent physiological lower leg oedema (water retention in the interstitial space of the lower limbs) is a frequent and unpleasant accompaniment to pregnancy, causing discomfort, a feeling of heaviness, night cramps and painful paraesthesia.7

In recent years, there has been an increased acceptance of the use of complementary therapies within the healthcare system.8–10 The use of non-pharmacological interventions to complement modern technological medicine is proving popular among nurses and midwives in clinical practice.11–13 Foot massage is an example of an intervention that can be used for specific conditions such as leg and foot oedema as it moves extravascular fluid without disturbing intravascular fluid.14,15

Very few studies have investigated alternative therapies that aim to reduce the effects of late pregnancy...
Kent et al. compared the effect on pregnancy oedema of standing on land, static immersion in water and water aerobics, each for 30 min, in 18 women at 20–30 weeks of gestation. Although static immersion and water aerobics induced substantial diuresis (180 and 187 mL), only static immersion decreased leg volume. Hartmann and Huch found that a single exercise session of 45 min in water significantly decreased severe bilateral lower leg oedema in nine women with otherwise uncomplicated pregnancies. Mollart did not obtain significant results on lower limb oedema from two reflexology techniques when compared with bed rest. Katz et al. also found that immersion was a faster and safer way than bed rest to effect the mobilization of extravascular fluid. None of these studies have used foot massage.

Foot massage is manipulation of soft tissue of the foot and is more general and does not focus on specific areas that correlate with other body parts. Reflexology is another therapy that applies pressure to specific areas of the feet or hand.

The current study was planned as preliminary randomized controlled trial to assess the effect of foot massage in decreasing physiological lower leg oedema in late pregnancy and this is the first study to evaluate this form of treatment.

METHODS

After receiving Ege University Nursing School Scientific Ethics Committee approval, a randomized controlled trial took place in the Manisa Central Primary Health Care Clinic 1, Turkey. During a 6-month period between March 2007 and August 2007, women were invited to participate in the trial during antenatal visits. We tested the one-sided hypothesis that a daily 20 min foot massage for 5 days will decrease lower leg circumferences in lower leg oedema.

The inclusion criteria for admission to the trial included: (i) normal pregnancy of > 30 weeks of gestation; (ii) visible oedema of the ankles and feet; and (iii) attendance at the Manisa Central Primary Health Care Clinic 1 for pregnancy care. The exclusion criteria were the presence of psychiatric problem, pre-eclampsia, eclampsia and systemic coexisting disease.

After having their written consent, potential participants were pair-matched, then randomly assigned one of two women from a matched pair to the experimental group or the control group. The experimental and control groups were pair-matched statistically for age, number of pregnancies and week of pregnancy and thus groups were formed with homogeneous distribution ($P = 0.753$, $P = 0.412$, $P = 0.093$, respectively). Women in the experimental group were given a 20 min foot massage daily for 5 days, whereas those in the control group received standard prenatal care alone.

The data collection for the control group included filling out a form containing questions about their socio-demographic and obstetric characteristics on the first day of Stage I. Measurements were taken of the participants’ ankles, insteps and foot/toe junctions when they were in a sitting position and made using a tape measure (stretch property controlled). These measurements took on average 15 min at each stage. The ankle circumference was measured medially and laterally above the malleoli, where the diameter was the smallest. The instep circumference was measured over the cuneiform and cuboid bones distal to the heel, and the third circumference was measured on the distal end of the foot, at the metatarsal–phalanges joint (the MP joint; where toe joins the foot) as shown in Figure 1. The same data were obtained from the control group in Stage II (Fig. 2).

During the data collection for the experimental group, on the first day of Stage I, the same form that was used for the control group was completed and the pre-foot massage measurements were recorded. Then the pregnant women were given a 10 min massage to each foot for a total of 20 min of massage. This was repeated every day in the same manner and at 10 o’clock time for 5 days. In Stage II, measurements were once again taken for the experimental group. To determine whether the massage had a lasting effect, in Stage III the measurements were again recorded 2 days after the massage programme had finished (Fig. 2).

As mentioned above, the intervention consisted of a 20 min massage daily for 5 days. These foot massages were administered by the same investigator (A. Çoban),
who was trained in foot massage by a professional masseur. Johnson’s® baby oil (Johnson & Johnson, New Brunswick, NJ, USA) was used during the foot massage to prevent friction and possible resultant discomfort. The study used a standard massage technique without pressure on the points indicated on a reflexology foot as previously described. The massage started with the foot being held firmly, then stroked in its entirety from the toes to ankle along the top of the foot using the whole hand, and returning under the foot to the toes using less pressure. The second movement involved thumbs kneading the foot from the toes to the ankle while supporting the foot with the fingers underneath. The skin surface between each tendon on the top of the foot was then stroked one after another using thumbs. The foot was then grasped with both hands and gently manipulated from side to side. The toes were then held with one hand whereas the other hand supported the foot and the toes were gently bent back-wards and forwards. Each of these movements was carried out 10 times in succession. The right foot were always massaged before the left and the same method was used for each foot in turn.

The Statistical Package for Social Science 11.0 computer program (SPSS Inc., an IBM company, Chicago, IL, USA) was used to analyse the data. The $\chi^2$ test was used to ensure the groups’ homogeneity (age, gravidity and gestation). The quantitative data were analysed using paired-samples $t$-test to identify differences in foot measurement before and after the intervention. Student’s $t$-tests were also used to identify differences between the two groups. All statistical tests used a level of significance of 0.05.

**RESULTS**

**Participants’ characteristics**

Eighty women were invited to participate in the study. All 80 participants completed the intervention and all
outcome measures (Fig. 3). Descriptive statistics for the two groups’ means, standard deviations and ranges are expressed in Table 1.

In the experimental group, average length of time participants had been married was 5.0 (SD 4.9; range 1–18), and they had given birth an average of 1.6 (SD 0.3) times; on average, they had 1.1 (SD 0.3) surviving children, and these averages in the control group were 4.6 (SD 4.0; range 1–15), 1.2 (SD 0.4), 1.2 (SD 0.4), respectively.

According to the survey in the experimental group, 85.0% of the informants have three main meals a day, whereas 51.4% have two snacks between meals per day and 47.5% have consumption normal dietary salt; on average, they drink 9.3 (SD 4.3) glasses of water per day. In the control group, 72.5% of women have three main meals a day, 42.4% have two snacks between meals per day and 55.0% have consumption normal dietary salt; on average, they drink 6.5 (SD 3.1) glasses of water per day. In terms of weight gain according to the duration of

© 2010 Blackwell Publishing Asia Pty Ltd
pregnancy, 35.0% women in the experimental group and 36.0% women in the control group of informants reported they had gained more weight than expected even allowing for the pregnancy.

The informants also reported that participants in the experimental group spent on average 5.8 (SD 2.6) h standing up and 5.6 (SD 2.1) h sitting down during the day, and these average in the control group were found 6.0 (SD 2.7), 5.2 (SD 2.5), respectively.

Effect of foot massage
Measurements taken of the right ankle (paired \( t = 3.873, P = 0.000 \)), right instep (paired \( t = 5.024, P = 0.000 \)), right MP joint (paired \( t = 2.592, P = 0.013 \)) and left MP joints (paired \( t = 4.482, P = 0.000 \)) of participants in the experimental group after their fifth-day programme of daily 20 min foot massages showed a statistically significant difference between these measurements and those taken before the 5-day massage programme began, although they did not indicate a statistically significant difference in average measurements taken of the left ankle \( (t = 0.029, P = 0.984) \) and left instep \( (t = 1.553, P = 0.129) \).

Table 2 Average score on lower leg circumferences by groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Control group (N = 40)</th>
<th>Massage group (N = 40)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stage I</td>
<td>Stage II</td>
</tr>
<tr>
<td></td>
<td>Mean ± SD (range)</td>
<td>Mean ± SD (range)</td>
</tr>
<tr>
<td>Right</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ankle</td>
<td>25.60 ± 1.70 (23.00–30.00)</td>
<td>26.19 ± 2.36 (23.00–36.00)</td>
</tr>
<tr>
<td>Instep</td>
<td>25.68 ± 1.63 (21.00–29.00)</td>
<td>25.93 ± 1.70 (21.00–30.00)</td>
</tr>
<tr>
<td>MP joint</td>
<td>23.81 ± 1.60 (20.00–27.00)</td>
<td>24.40 ± 1.98 (20.00–32.00)</td>
</tr>
<tr>
<td>Left</td>
<td>25.33 ± 1.72 (22.00–30.00)</td>
<td>25.69 ± 1.89 (22.00–31.00)</td>
</tr>
<tr>
<td>Ankle</td>
<td>25.74 ± 1.75 (21.00–30.00)</td>
<td>26.14 ± 1.86 (21.00–30.00)</td>
</tr>
<tr>
<td>Instep</td>
<td>23.86 ± 1.81 (21.00–29.00)</td>
<td>24.09 ± 1.85 (21.00–30.00)</td>
</tr>
</tbody>
</table>

MP joint, metatarsal–phalanges joint; SD, standard deviation.

© 2010 Blackwell Publishing Asia Pty Ltd
difference between the two groups in circumference measurements (except for the left ankle).

DISCUSSION

We sought to evaluate the effects of foot massage on physiological oedema in the lower leg. Because massage has been shown to be an effective treatment for oedema, stimulating circulation, we were hopeful that foot massage might show a similar effect on physiological lower leg oedema in late pregnancy.2,14,21,22

In the current study, the right foot was always massaged before the left. This might explain unusual finding that the massage seemed to be more effective for the right foot than the left, because the investigator who administered foot massage might start to fatigue and the foot massage of second foot tended to be less effective than the first foot.

The findings from the study indicated that a 20 min foot massage daily for 5 days significantly reduced physiological lower leg oedema in late pregnancy. These findings support the effectiveness of foot massage as an intervention to reduce physiological lower leg oedema. The experimental group showed a consistent decrease in all circumferences compared with the control group in the study. Kent et al.2 and Hartmann and Huch7 published similar findings, using different methods. Mollart3 and Katz et al.18 did not obtain significant results on physiological lower leg oedema in late pregnancy.

Conclusion

Physiological lower leg oedema is a common problem in late pregnancy, and foot massage might provide effective relief for this condition. Our study results suggest that regular foot massage is beneficial in terms of decreasing physiological lower leg oedema in healthy women without obstetric complications.

ACKNOWLEDGEMENTS

The authors wish to thank Mr M. Yalın (the masseur in Hospital of Celal Bayar University) and Dr U. İnceboz (Professor, PhD, School of Medicine, Balıkesir University), the staff and patients for their cooperation and participation in the study.

REFERENCES


Table 3 Differences in average lower leg circumferences measurements by groups (between Day 1 and Day 5)

<table>
<thead>
<tr>
<th>Mean measurement changes</th>
<th>Control group (N = 40)</th>
<th>Massage group (N = 40)</th>
<th>(95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right ankle</td>
<td>0.60</td>
<td>−0.20</td>
<td>0.19–1.38</td>
<td>0.010</td>
</tr>
<tr>
<td>Left ankle</td>
<td>0.36</td>
<td>−0.50</td>
<td>−0.15–0.88</td>
<td>0.167</td>
</tr>
<tr>
<td>Right instep</td>
<td>0.25</td>
<td>−0.25</td>
<td>0.23–0.77</td>
<td>0.000</td>
</tr>
<tr>
<td>Left instep</td>
<td>0.39</td>
<td>−0.19</td>
<td>0.37–0.81</td>
<td>0.000</td>
</tr>
<tr>
<td>Right MP joint</td>
<td>0.60</td>
<td>−0.21</td>
<td>0.35–1.26</td>
<td>0.001</td>
</tr>
<tr>
<td>Left MP joint</td>
<td>0.23</td>
<td>−0.14</td>
<td>0.13–0.61</td>
<td>0.002</td>
</tr>
</tbody>
</table>

A positive number denotes an increase and a negative number denotes a decrease. CI, confidence interval; MP joint, metatarsal–phalanges joint.


© 2010 Blackwell Publishing Asia Pty Ltd