



Reflexology Versus Traditional Physical Therapy Program in pre-eclampsic pregnant women with ankle oedema

Khadyga S. Abdulaziz¹, Amira H. Draz^{2*}

¹Department of Gynecology and Obstetrics Faculty of Physical Therapy, CairoUniversity, Egypt.

²Department of Basic Science, Faculty of Physical Therapy, CairoUniversity, Egypt.

Abstract:**Purpose:** This study was conducted to examine the effect of foot reflexology on preeclampsic women with ankle edema. **Methods:** Sixty mild preeclampsic women were selected from the outpatient clinic of Gynecology and Obstetrics Kasr El Ani Hospital. Their ages were ranged from 25-35 years old; their gestational age was more than 20weeks' and less than 25 weeks' and their BMI didn't exceed 35 kg/m². They were assigned into two groups, traditional exercises group and reflexology group. Both groups were having the same antihypertensive drug (Methyldopa). The reflexology group underwent a program of foot reflexology for 3 times per week for 6 weeks. Blood pressure (systolic & diastolic) and ankle edema were evaluated for both groups. **Results** of this study revealed that, there was a statistically significant decrease in systolic blood pressure, diastolic blood pressure and edema volume in both groups after 6 weeks of management. Also, there was a statistically significant difference between both groups after treatment in systolic blood pressure, diastolic blood pressure and edema volume more decrease in reflexology group. **Conclusion:** Foot reflexology is an effective treatment intervention in the management of preeclampsic pregnant woman with ankle edema.

Key words: reflexology/ preeclampsia/ hypertension/ ankle edema.

Introduction:

Swelling of the ankles may be due to the body holds more fluid in pregnancy. A certain amount of swelling, or edema, is normal later in pregnancy; however, more severe cases may indicate preeclampsia if present with other symptoms and signs ^[1].

More severe swelling during pregnancy may be a sign of preeclampsia (also called toxemia), which is a serious condition that includes high blood pressure and swelling. Swollen legs may be a sign of heart failure, kidney failure, or liver failure. In these conditions, there is too much fluid in the body ^[2].

Preeclampsia, a human -pregnancy-specific disease defined as the occurrence of hypertension and significant proteinuria in a previously healthy woman on/or after the 20th week of gestation, occurs in about 2-8% of pregnancies ^[3].

Preeclampsia may also be accompanied by rapid weight gain and edema, appearance of coagulation or liver function abnormalities, and occurs most often in nulliparas, usually after gestational week 20 and most frequently near term. Attempts have been made to categorize Preeclampsia as "mild" or "severe" ^[4].

Gestational edema occurs in over 80% of pregnancies. It can be constant or intermittent in nature, and is particularly pronounced in women with a history of pre-menstrual syndrome ^[5].

The main priorities of treatment as with other types of chronic edema are to reduce the edema, improve the skin condition, reduce the incidence of cellulitis and generally improve the patient's quality of life. Although compression treatment can form part of the management, the focus is often on relieving symptoms rather than aiming to control the swelling fully^[6].

Reflexology has the potential to provide pain relief and symptoms relief, induce relaxation, and reduce blood pressure without harmful side effects ^[7,8]. Lymphatic reflexology technique can be used for specific condition such as leg, foot and generalized edema^[9].

The purpose of this study was to examine the effectiveness of reflexology versus traditional physical therapy protocol in Preeclampsic pregnant women with ankle edema.

Methods

Subjects

Sixty pregnant women suffering from moderate to severe bilateral ankle oedema, identified by the patient reported edema questionnaire ^[10], had participated in this study. They were recruited from the outpatient clinic of Gynecology and Obstetrics Kasr El Ani Hospital. Their ages were ranged from 25-35 years old; their gestational age was more than 20 weeks' and less than 25weeks' gestation and their body mass index (BMI) were not exceeding 35 Kg/m². This study was approved by the Ethics Committee for Scientific Research of the Faculty of Physical Therapy, Cairo University.

Inclusion criteria: Mild cases of preeclampsia and continued to their medical treatment with leg edema. **Exclusion criteria:** skin diseases, marked restriction of active range of motion in the affected lower extremity, Cardio-respiratory diseases, Diabetes mellitus and any mental or physical disorders were excluded from this study.

Pregnant women were randomly distributed using computerized generated method into two groups equal in number.

Traditional exercises group: consisted of 30 pregnant women who received only traditional physical therapy protocol in the form of leg elevation, circulatory exercises, wearing supportive stocking and avoiding standing in one position for extended periods. It was performed 3 times per week for 6 weeks and continued to their medical treatment. While foot reflexology group consisted of 30 pregnant women who received the same traditional physical therapy protocol and also continued to their medical treatment in addition to, foot reflexology. It was performed 6 times per week for 6 weeks.

Evaluation instruments:

Weight–Height scale was used to measure weight and height and to calculate BMI before starting this study ^[11]. Foot Volumeter was used to assess foot and ankle edema before starting and after the end of the treatment course ^[12]. Patient reported edema Questionnaire was used to determine the level and bothersomeness of edema ^[10] Mercury sphygmomanometer and stethoscope: was, used to measure the arterial blood pressure.

Evaluation procedures:

Weight and height of each pregnant woman were measured and BMI was calculated. Foot volumeter was used for assessment of ankle edema. It consisted of a clear acrylic rectangular box (13"x5"x9") with a spout at the top of one of the short sides. It was filled with 10 gallons water until water rushed out of the spout. A water temperature was between 20 and 32°C.

- The pregnant woman stood and inserted her foot slowly into the volumeter, and the displaced water collected and measured in a graduated cylinder which was equal to the volume of the foot/ankle, before

and after 6 weeks of the treatment course ^[13]. Care was taken so that the leg was perpendicular to the floor and not leaning to either side.

- Patient reported oedema questionnaire was used to assess the level and the bothersomeness of the ankle edema at starting of the treatment course. A full instruction was given to each pregnant woman about the questionnaire. It consisted of 6 items scored on 0-25 points. It assessed the frequency of the ankle swelling per week (7 points), level of the ankle swelling (5 points), the bothersomeness of the swelling (5 points), times of day at which the ankle swelling occurs per day (4 points), the influence of ankle swelling on the normal activities (2 points), and the difficulty to answer the questionnaire questions (2 points). A suitable time was given to each pregnant woman to answer freely about the questionnaire questions.

Measurement of arterial blood pressure: from right arm in half lying position for both groups

Treatment procedures:

Traditional exercises group:

Each pregnant woman in the control group was treated by only traditional physical therapy protocol. This protocol consisted of advices and circulatory exercises. It was performed 3 times per week for 6 weeks.

Circulatory exercises: From the supine position perform all movements of ankle joint. ^[14].

Reflexology group:

Each pregnant woman had the same traditional physical therapy protocol and continued to their medical treatment in addition to, foot reflexology.

The pregnant woman was in supine position and wearing a comfortable clothes and covered except the treated foot. The treatment was applied to the following reflex zones ^[15].

1-Liver reflex zone: It is located distal to the tuberosity of the 5th metatarsal along the lateral plantar fascia and the abductor digiti minimi muscle. The liver covers zones 5, 4, 3 and 2 ^[16].

2-Kidney reflex zone: It is located between the flexor hallucis longus tendon and the flexor digitorum brevis muscle. The kidneys are located on the back side of the body, thus the reflex points are located deeper in the foot than most other reflexes. (in between zone 2 and zone 3) ^[17].

3-Gastro-intestinal tract reflex zones:

A- Small intestine reflex zone: It is located on lateral aspect of foot zones 1 to 5 from heel line to waistline, covering the ovary, uterus, fallopian tube, ureters, and prostate reflexes. ^[18].

B-Ascending colon reflex zone: It is located at the midpoint between zone 4 and 5 just below the heel line. ^[18].

C-Transverse colon reflex zone: It is located along the middle of the sole of foot from the lateral aspect of foot ^[18].

4- Groin, lymphatic and ankle reflex zone: It is located on the dorsal aspect of the foot in the crease from the ankle bone to ankle bone, medial to lateral. ⁽¹⁸⁾ (Linda, 2003). Treatment was applied 5 minutes for every reflex zone. The total duration of the session was 30 minutes. Foot reflexology was performed 3 times per week for 6 weeks.

Statistical Analysis:

Data were analysed by using a Statistical Package for Social Sciences (SPSS) for Windows version 16.0. (SPSS, Inc., Chicago, Illinois). Paired test was used to compare within groups before and after the treatment and Dependent t-test was used to compare between the two groups. Level of significance was set at 0.05.

The demographic data were represented by mean and standard deviation for all groups.

Results:

Traditional exercises group:

Thirty patients were included in this group, their mean age was (30.1±2.91 years), weight (79.26±6.4 Kg), height (162.6±4.78 cm) and BMI (29.96±1.87 Kg/m²),table(1).

Reflexology group:

Thirty patients were included in this group, their mean age were (29.9±3.38 years), weight (80.96±6.98 Kg), height (162.96±5.96 cm) and BMI (30.52±2.57 Kg/m²), table(1).

Table 1:General characteristics of both groups

Variables	Group (A)		Group (B)		Comparison	
	Mean	±SD	Mean	±SD	t-value	Level of Significance
Age (yrs)	30.1	±2.91	29.9	±3.38	0.24	P<0.8
Weight (Kg)	79.26	±6.4	80.96	±6.98	0.98	P<0.33
Height (cm)	162.6	±4.78	162.96	±5.96	0.26	P<0.79
BMI (Kg/m ²)	29.96	±1.87	30.52	±2.57	0.94	P<0.34

Table 2: Systolic blood pressure (mmHg)

Statistics	Systolic blood pressure (mmHg)				Between groups p-value
	Group (A)		Group (B)		
	Pre treatment	Post treatment	Pre treatment	Post treatment	
Mean ±SD	156.83±4.44	143.66±5.86	156.5±5.11	135.5±6.06	P<0.001*
Percentage of Improvement	8.39 %		13.41 %		
t-value	12.96		15.15		
P- value	P<0.001*		P<0.001*		

SD: standard deviation,

***P: probability**

The independent t-test results for the systolic blood pressure pre and post treatment between both groups,there was statistically no significant difference (P= 0.78) in pre-treatment values between both groups. But, there was a highly statistically significant difference (P< 0.001) in the post treatment values which in favour Reflexology group than Traditional exercises group. With a percentage of improvement 8.39 % and 13.41 % for group Traditional exercises group and Reflexology group respectively table (2).

The independent t-test results for the Diastolic blood pressure pre and post treatment between groups. There was statistically no significant difference (P= 0.83) in pre-treatment values. But, there was a statistically significant difference (P< 0.001) in the post treatment values which in favor group Reflexology group than Traditional exercises group. With a percentage of improvement 7.26 % and 13.02 % for Traditional exercises group and Reflexology group respectively table (3).

Table3: Diastolic blood pressure (mmHg)

Statistics	Diastolic blood pressure(mmHg)				Between groups p-value
	Control Group (A)		Study Group (B)		
	Pre treatment	Post treatment	Pre treatment	Post treatment	
Mean± SD	96.33±6.14	89.33±7.27*	96.0±5.78	83.5±4.38*	P<0.001*
Percentage of Improvement	7.26 %		13.02 %		
t-value	11.36		14.6		
P- value	P<0.001*		P<0.001*		

SD: standard deviation,

***P: probability**

Table 4: edema volume (ml)

	Edema volume (ml)				Between groups P value
	Study group (B)		Control group (A)		
	Pre treatment	Post treatment	Pre treatment	Post treatment	
Mean ±SD	1180.0 ±201.60	824.66 ±158.96*	1142.66±213.49	975.93±175.02*	P<0.001*
Percentage of improvement	30.11 %		14.59 %		
t-value	10.11		8.73		
P- value	P<0.001*		P<0.001*		

***SD: standard deviation,**

***P: probability**

The independent t-test results for the edema volume pre and posttreatment between the Reflexology group and Traditional exercises group. There was no significant difference between the pre- treatment values (P=0.49), while there was a significant decrease between the post treatment values (P<0.001), in favor of the Reflexology group. With a percentage of improvement 14.59 % and 30.11 % for Traditional exercises group and Reflexology groups successively table (4).

Discussion:

Hypertension, complicating 5% to 7% of all pregnancies, which is a leading cause of maternal and fetal morbidity, particularly when elevated blood pressure is due to preeclampsia, either alone (pure) or “superimposed” on chronic vascular disease [19].

Preeclampsia may also be accompanied by rapid weight gain and oedema, appearance of coagulation or liver function abnormalities, and occurs most often in nulliparas, usually after gestational week 20, and most frequently near term. Attempts have been made to categorize preeclampsia as “mild” or “severe” [20].

Reflexology may be used for specific conditions in the lower limbs and generalized edema as it moves fluids from extra vascular compartments without affecting intravascular fluids [15]. It also assists the lymphatic system by encouraging circulation of lymph fluid and balancing the energy in filtration nodes and related organs [21].

This study was conducted to determine the effect of reflexology versus traditional physical therapy protocol in preeclampsia pregnant women with ankle edema.

Results of this study found that there is a significant decrease in systolic blood pressure, diastolic blood pressure and oedema volume in both groups (A&B) after 6 weeks of management. But there was a significant difference between both groups post treatment in systolic blood pressure, diastolic blood pressure and Oedema volume (more decrease in group B).

The results of this study were supported by **Karima and Eman 2011**^[22], who found that foot reflexology can reduce blood pressure levels in patients with hypertension. They investigated the effect of foot reflexology on blood pressure and quality of life among hypertensive patients. A quasi-experimental study was conducted for patients with hypertension attended the outpatient clinic of the Specialized Medical Hospital at Mansoura University, Egypt, enrolled in this study during six months, between 15 May and 14 October 2010 were randomly allocated into two equal groups (40 in the foot reflexology group (intervention), and 40 in the control group. And found that; Systolic blood pressure decreased significantly in intervention group from 160.2mmHg to 136.5mmHg compared to (162.5mmHg to 155.2mmHg) in controls. There was a statistically significant decrease in means of diastolic blood pressure between pre and post intervention (102.0mmHg –87.5mmHg) within the intervention group ($p < 0.05$), Change in control group was not proved to be statistically significant (100.1mmHg –96.4mmHg pre and post readings respectively, $p > 0.05$).

The results of this study agreed with **Park HS ,Cho GY 2004.**^[23] Who found that foot reflexology is an effective nursing intervention to decrease systolic blood pressure, diastolic blood pressure and to treat fatigue but not serum lipids. Their study included thirty-four participants who were assigned to either an experimental group (18) or a control group (16), Foot reflexology was administered twice a week for 6 weeks to participants in the experimental group. And there was a significant decrease in systolic blood pressure and diastolic pressure in the experimental group compared to the control group.

The results of this study agreed with the work done by **Frankel 1997**^[24] as he explored the effects of foot reflexology on the baroreceptor reflex, which controls blood pressure. As he found that baroreceptor reflex sensitivity was significantly lowered in the intervention groups (foot reflexology and foot massage), compared with the control group. Baroreceptor reflex sensitivity was measured using sinus arrhythmia and phase IV of the Valsalvamanuever, a period in the Valsalvamanuever during which blood pressure is substantially raised above the baseline. He also found that, between foot reflexology and foot massage, there was no significant difference in resting blood pressure after intervention.

The results of this study agreed with results of **Tsang et al., 2003**^[25] who stated that elevation of an extremity is a universal treatment aimed at decreasing effusion and edema formation. It is generally accepted that elevation affects edema formation by altering the influences of gravity and when an extremity is in a gravity-dependent position, the force of gravity increases hydrostatic pressure in the peripheral blood vessels while also increasing resistance to venous and lymphatic flow. This results in an increase in fluid movement into the tissues, thereby increasing extremity volume.

The result of this study agreed with the findings of **Mollart, 2003**^[15] who stated that the lymphatic foot reflexology technique has a significant effect on reducing gestational ankle edema. He reported that reflexology is beneficial for women experiencing edema more around their ankles, ball of the foot and the dorsal aspect distal end of the foot. These reflex zones correspond to the very vascular pregnant pelvis and the growing uterus, chest and developing breast tissue and indirect breast areas respectively.

Also, The results of this study may be explained by **Valiani et al., 2010**^[26] who reported that reflexology can bring about relaxation and comfort in the individual through physiological changes and release of endorphins and anesthesia feeling can create comfort and can cause reduction in the maternal stress and increase her peace of mind, which consequently would have a positive effect on the labor progression and her satisfaction and effect on decreasing ankle edema.

Conclusion

It can be concluded that, foot reflexology is an effective treatment intervention in the management of preeclamptic pregnant woman with ankle edema.

References

1. National Collaborating Centre for Women's and Children's Health (NCCWCH). Antenatal care: routine care for the healthy pregnant woman. Clinical guideline, 2nd Ed., London: NIHC; 2008. pp. 82-110.
2. Fang, J. and O'Gara, P. The physical examination: an evidence-based approach. In: Bonow, RO., Mann, DL., Zipes, DP., and Lipp, P. (eds). Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 9th Ed., Philadelphia, Pa: Saunders Elsevier; 2011. pp. 134-150.
3. Ghulmiyyah L and Sibai B: "Maternal mortality from pre-eclampsia/eclampsia," *Seminars in Perinatology*, 2012.36 (1): 56-59.
4. Menzies J, Magee L, MacNab Y, Ansermino J, Li J, Douglas M, Less S, Moore M, Moutquin J, Less S, Walker J, Walley K and Von Dadelszen P: Current CHS and NHBPEP criteria for severe preeclampsia do not uniformly predict adverse maternal or perinatal outcomes, *Hypertens Pregnancy*, 2007. 26:447-462.
5. Michael, F.: Text book of lymphology, 3rd Ed., New York: Elsevier Health Sciences, 2012. pp. 92-97.
6. Clein, L. and Pugachev, E.: "Reduction of oedema of lower extremities by subcutaneous controlled drainage: 8 cases". *Am J Hospice Palliat Med*; 2004.21(3): 228-32.
7. Oleson, T., and Flocco, W.: "Randomized controlled study of premenstrual symptoms treated with ear, hand, and foot reflexology". *ObstetGynecol*; 1993.82(6):906-911.
8. Stephenson, N., Dalton, J. and Carlson, J.: "The effect of foot reflexology on pain in patients with metastatic cancer". *Applied Nursing Research*; 2003.16(4): 284-286.
9. Enzer, S.: *Reflexology: a tool for midwives soul to sole Reflexology*, 1st Ed., Australia, Pynble; 2000. pp.44-58.
10. Brodovicz, G., Mcnaughton, K., Uemura, N., Meininger, G., Girman, J., and Yale, H.: "Reliability and Feasibility of Methods to Quantitatively Assess Peripheral Edema". *J ClinMed&Research*; 2009.7(1):21-31.
11. Eknoy, G. and Gorabed, S. (2008): " Neurohormonal- cytokine interactions: implications for inflammation. Common human diseases and well-Being". *Neurochem. Int.*; 52(12): 40-51.
12. Mamoulakis, D., Bitsori, M., Galanakis, E., Raissaki, M. and Kalmanti, M.: Insulin-induced oedema in children and adolescents *J Paediatr Child Health*. 2006 Oct;42(10):655-7.
13. Pasley, D. and O'Connor, J.: High day-to-day reliability in lower leg volume measured by water displacement. *Eur J Appl Physiol*; 2008. Jul;103(4):393-8.
14. Winter, H.: *Complete Guide to Symptoms, Illness & Surgery*, 5th Ed., New York: The Berkeley Publishing Group, 2006. pp.8-10.
15. Mollart, L.: "Single-blind trial addressing the differential effects of two reflexology techniques versus rest, on ankle and foot edema in late pregnancy". *Complementary Therapies in Nursing and Midwifery*; 2003. 9 (4):203-208.
16. Dougans, I.: *The Complete Illustrated Guide to Reflexology*, 1st Ed., London: Element Books Limited, 1996. pp.49.
17. Crane B.: *Reflexology—the Definitive Practitioner's*, 1st Ed., England: Manual Element Books Limited, 1997. pp. 1-443.
18. Linda H.: *Foot Reflexology Manual*, Reflexology Association of Canada: Winnipeg Canada; 2003. pp.8-11.
19. Ness R. and Roberts J.: Epidemiology of Hypertension, In: Lindheimer M, Roberts J, Cunningham F, Eds. *Chesley's hypertensive disorders in pregnancy*. 2nd Ed. Stamford, CT: Appleton & Lange, London, 2009. PP.43-65.
20. Menzies J, Magee L, MacNab Y, Ansermino J, Li J, Douglas M, Less S, Moore M, Moutquin J, Less S, Walker J, Walley K and Von Dadelszen P: Current CHS and NHBPEP criteria for severe preeclampsia do not uniformly predict adverse maternal or perinatal outcomes, *Hypertens Pregnancy*; 2007.26:447-462.
21. Katy, D.: *Reflexology: Reference to go:50 healing techniques*. 1st Ed. San Francisco: Chronicle Books; 2012. pp.49.

22. Karima E.SH. and Eman E.S.: Effect of Nursing Interventions Using Foot Reflexology on Blood Pressure and Quality of Life of Hypertensive Patients at Mansoura University Hospitals: Preliminary Results. *Med. J. Cairo Univ.*;2011.Vol. 79, No. 2, September: 193-202.
23. Park H.S. and Cho G.Y: 'Effects of foot reflexology on essential hypertension patients', *DaehanGanho Hag-hoeji*, 2004.Vol. 34, No. 5, pp. 739-750.
24. Frankel B. S.M.: 'The effects of reflexology on barore-ceptor reflex sensitivity, blood pressure and sinus arrhythmia', *Complementary Therapies in Medicine*'1997 .Vol. 5, pp. 80-84.
25. Tsang, K., Hertel, J. and Denegar, R.: "Volume Decreases After Elevation and Intermittent Compression of Postacute Ankle Sprains Are Negated by Gravity-Dependent Positioning. *J Athl Train*"; 2003.38(4): 320–324.
26. Valiani, M., Elaheh, S., Maryam, K., and Marziyeh, H.: "Reviewing the effect of reflexology on the pain and certain features and outcomes of the labour on the primiparous women". *Iran J. Nurs Midwifery Res.*;2010.15(1)302-310.
