Effect of Foot Reflexology on Low Back Pain Intensity and Functional Abilities Among Pregnant Women

Nadia Mahmoud Mohamed Mahmoud, Assistant lecturer
Obstetric and Gynecologic Nursing, Faculty of Nursing, Alexandria University.

Niven Rizk Mohamed, Professor
Obstetric and Gynecologic Nursing, Faculty of Nursing,Alexandria University.

Isis Emile Mikheal, Assistant Professor
Obstetric and Gynecologic Nursing, Faculty of Nursing, Alexandria University.

Abstract:

Background: Pregnancy related low back pain (PRLBP) is a medical and socioeconomic problem affects approximately 45–56% of pregnant women. Pregnancy-related low back pain is any type of idiopathic pain arising between the lower margin of the 12th rib and the inferior gluteal folds during the course of pregnancy. Symptoms of PRLBP could start from early in pregnancy until giving birth, but usually, the pain becomes more severe during the third semester of pregnancy and is described as dull pain. This complaint is aggravated in multiple pregnancies as well as by each new pregnancy. Objective: Determine the effect of foot reflexology on low back pain intensity and functional abilities among pregnant women. Setting: The study will be conducted at the antenatal clinics of El-Shatby Maternity University Hospital in Alexandria Governorate. Subjects: A convenience sample of 90 pregnant women with low back pain will be selected from the previously mentioned setting: Tools: three tools were used for data collection. The first tool was Socio-demographic characteristic and reproductive history structured interview schedule. The second tool was the visual analog scale used for subjective estimation of patient's pain. The third tool was Oswestry Low Back Disability interview schedule to evaluate functional abilities of pregnant women with low back pain. Results: The study results revealed a highly statistically significant difference between the studied groups in relation to their level of pain after intervention where (P= <0.001). *) . In relation to their functional abilities, a statistically significant difference was found between the control and the study group after intervention where p = <0.001. Conclusion: Pregnant women underwent a course of reflexology foot massage had significant decrease of low back pain intensity& increased functional abilities. Recommendations: Approach the administrative personnel of health care settings, in order to raise their awareness about the benefits of reflexology to pregnant women suffering from PRLBP so that they incorporate with pre service and in-service training of nurses to enable them to use it as non- pharmacological method for PRLBP

Key words: Foot reflexology, Pregnancy related low back pain (PRLBP), Functional abilities, and pregnant women

Introduction

The moment of pregnancy, in the process of a forming family, is a time when critical and vital situations are faced, because, during pregnancy and the puerperal period, there is a transformation and expansion of the marital system to a parental one (Ferreira et al., 2014). Pregnancy puts great demands on the body of a woman that pose psychic, somatic and often also social burden. A woman's experience is individual and depends on a number of factors and circumstances that affect the health and quality of life (QOL) of mothers to various degrees (Mazúchová et al., 2018).

Pregnancy related low back pain (PRLBP) is a frequently reported complaint during pregnancy. According to a Cochrane literature review more than two-thirds of pregnant women suffered from PRLBP. These pains often remain underestimated and undertreated (Ibanez et al., 2017

Despite the disabling effects of PRLBP, It is often untreated and considered normal and inevitable part of pregnancy among women. The exact cause of PRLBP is poorly understood, often considered multifactorial in nature, and associated with biomechanical, vascular and hormonal changes during pregnancy (Carvalho et al., 2017). There is currently no consensus regarding the risk factors for PRLBP. However, pelvic trauma, young age, multiparous, chronic low back pain (LBP) and history of LBP in the previous pregnancy have been indicated as the most common risk factors for PRLBP (Manyozo et al., 2019

PRLBP is an important cause of functional disability that impacts QOL of pregnant women .So that, well-being and QOL of pregnant women should be included within the scope of pregnancy monitoring and preventive health programs. All health professionals involved in pregnancy care (primary health care and hospital professionals) should thus be more sensitive to the different dimensions of health (Lima et al., 2017).

Non-pharmacological pain relief method is a good option for management of PRLBP. Examples of those methods include massage, relaxation techniques, calming music, mind-body practices, herbal remedies, meditation, therapeutic touch, acupuncture and acupressure (Chou et al., 2016)

Utilization of non-pharmacological interventions like foot reflexology in pain relief and increases individual feeling of pain control as well as decreases feeling of weakness, improves the activity level and functional capacity, and reduce the dosage of analgesic drugs needed thus decreasing the side effects of the treatment (Abdelaziz & Mohammed, 2014

On the same context, reflexology or zone therapy - particularly - emerges to be a practical therapy in the field of pain management. It is a restorative process of pain relief and health promotion via provoking feet's reflex points. It acts on the neurologic system by liberation of inner opioid materials. The foot is wealthy with points that receive and react to sensual stimulus. When activating these points via compression and a form of kneading is exerted on those receptors, a nerve urge is started and the nerve is stimulated through the afferent fibers to rise across the spinal cord to the brain (Majzoobi et al., 2014).

Besides, researchers proposed that the gate control theory of pain could be one of the hypotheses underling reflexology. Where non-distressing stimulus through large measurement nerve fibers (taping, pressure, trembling) convey inputs and close the "gates" to those painful ones, which stops pain senses from initiating to the central nervous system. Therefore, stimulation by non- destructive contribution is able to repress pain (Embong et al., 2015, 2017)

Aim of the study

The aim of the study is to: Determine the effect of foot reflexology on low back pain intensity and functional abilities among pregnant women.

Research Hypotheses:

Pregnant women who receive foot reflexology exhibit less low back pain intensity than those who do not receive it

Pregnant women who receive foot reflexology exhibit increased functional abilities than those who do not receive it.

Materials and Method

Materials:

Research design:

A quasi- experimental research design was utilized in this study, where the effect of independent variable (foot reflexology) on dependent variable (functional abilities & low back pain) was examined.

Setting:

The study was conducted at the antenatal clinics of El-Shatby Maternity University Hospital in Alexandria Governorate.

Subjects:

The sample size was estimate using Epi info 7 statistical program using the following parameters; Population Size =1500 /3 months, Expected frequency 50%, confidence level 95% and with 10% acceptable error. The minimum sample size estimated to be 80 women.

A convenience sample of 90 pregnant women with low back pain were be selected from the previously mentioned setting

Tools: three tools were used:

Tool one: Socio-demographic characteristic and reproductive history structured interview schedule:

Tool II: Visual analog scale (VAS):

The visual analog scale was developed by Melzac and Katz (1994). It was adopted and used by the researcher. The VAS is a self-report device which consists of a horizontal line used for subjective estimation of patient's pain. It comprises 10-point numerical scale, corresponding to the degree of pain with zero representing no pain and 10 representing the worst degree of pain. In between these two opposite ends, words as mild, moderate, severe are assigned to each 3 cm distance, respectively. Women asked to place a mark on the line at the point that represents the severity of their pain (Alghadir et al., 2018; Kersten et al., 2014).

Tool III: Oswestry Low Back Disability Interview Schedule

This tool was originally developed by Fairbank et al. (1980) to evaluate functional abilities of pregnant women with low back pain. It was adopted& translated to Arabic language by the researcher. It is composed of ten questions. (a) pain intensity, (b) personal care, (c)lifting, (d) walking, (e) sitting, (f) standing, (g) sleeping, (h) social life, (i) travelling, (j) employment and homemaking & each domain composed of six statements. For each question there was a possible 5 points; 0 for the first answer, 1 for the second answer, etc. Add up the total for the 10 questions and rate them on the scale at right. Maximum points were (50) points and minimum was (0) points (Sencan et al., 2018). The total score was categorized as follows:

• 0 - 4 representing no disability

• 5 - 14 representing mild disability

• 15 - 24 representing moderate disability

• 25 - 34 representing severe disability

• 35 - 50 representing complete disability.

Method:

The study was accomplished as follows:

- An approval from Ethical Research Committee, Faculty of Nursing-Alexandria University, was obtained.

- The researcher attended a training program on how to conduct foot reflexology for 3 days at Arab African Union, Supreme Body for Complementary Medicine which is certified by Ministry of Culture and Ministry of investment at Alexandria governorate and an accredited certificate was obtained.

- An Official letter was directed from the Faculty of Nursing, Alexandria University to the responsible authorities of the study setting to take their permission for data collection

after explanation of the purpose of the study.

- Tool I was developed by the researcher and reviewed for content validity by a jury of five experts in the field.

- Tools II, III were translated into Arabic language. They were tested for content validity by a jury of five experts in the field.

- Tools II, III were tested for its reliability by using internal consistency test (cronbach α).

- A pilot study was carried out on 10 women who were excluded from the main study sample to test the clarity and applicability of the tools and modifications were done.

- The control group: which include (45) pregnant women who received the routine hospital care.

- The study group: which include (45) pregnant women for whom foot reflexology was applied. The reflexology technique was conducted according to the following steps:

- The mother's foot was elevated by supporting it with a pillow.

- The researcher took one foot in his hands and put his thumbs on the inside arch of the foot. Alternating thumbs, pressed his thumbs up and down the inner soles of feet, concentrating on the area of the back that needs it the most.

- For lower back pain, spent more time on the area along the inner sole between the heel and the middle of the foot.

- The heel and ankle were pressed between the researcher's thumb and forefinger. This was done to

lukewarm the skin of the foot generating rest and increasing blood flow.

- The pillow support was removed to finish the massage.

- The study group received foot reflexology massage once every week for a total of three weeks for every woman during their antenatal visits. Each session lasted nearly 20 minutes, 10 minutes for each foot.

- The control group was started and completed before the experimental group to avoid contamination of the sample.

- After collecting data, the necessary statistical analysis was done.

- Effect of foot reflexology was determined by comparing the pain intensity and functional abilities between the two groups before and after intervention

- Collection of data consumed 4 months starting from August 2021 till the end of November 2021.

Statistical analysis was done by the researcher after collection of data by using Statistical Package for Social Sciences (SPSS version 20) program. The collected data was categorized, coded, computerized, tabulated and analyzed using frequency distribution tables, percentage, means and standard deviations. Also, marginal homogeneity test, student t-test, chi-square test, fissure exact test, Mann Whitney test and Wilcoxon signed ranks test. Significance of the obtained results was judged at the 5% level.

Ethical Considerations:

Written informed consent was obtained from women before data collection and after explanation of the study aim.

Privacy of the study participants was asserted.

Confidentiality of the collected data was maintained.

Every woman informed that her participation in the study is voluntary and she can withdraw at any time.

Results

Table (1): presents the number and percent distribution of the study participants according to their socio-demographic characteristics.

No statistical significant difference was found in relation to age, level of education, occupation, current residence and marital status between the control and the study group where p = (0.398, 1.000, 1.000, 1.000, 1.000) respectively.

Table (2) presents the number and percent distribution of the study participants according to low back pain intensity with visual analog scale. No statistical significant difference was found in relation to level of pain between the control and the study group during first session before intervention where p= 0.561. While there is statistical significant difference was found in relation to degree of pain between the control and the study group during first session after intervention where p = (<0.001).

Also, there is statistical significant difference in relation to degree of pain between the control and the study group during second before and after intervention where p = (<0.001& <0.001) respectively.

In addition, there is statistically significant difference in relation to degree of pain between the control and the study group during third session before and after intervention where p = (<0.001& <0.001) respectively

Table (3): shows number and percent distribution of participants according to total score of Oswestry low back pain disability interview schedule. No statistically significant difference in relation to overall of Oswestry low back pain disability interview

schedule between the control and the study group before intervention where p = 0.310, while a statistical significant difference was found between the control and the study group after intervention where p = <0.001

Figure (1) shows correlation between low back pain intensity and low back pain disability after intervention in third session among the study group. There was a positive correlation between low back pain intensity and low back pain disability after intervention in third session among the study group. This means the less pain experience, the less disability

Discussion

Pregnancy related low back pain (PRLBP) is one of the most common complaints among pregnant women. Despite this, it is often written off as a normal experience during pregnancy and mostly overlooked by healthcare professions, thus remaining untreated in many pregnant women (Gutke et al., 2018.

PRLBP results into many women resorting to self-care through the use of self-prescribed painkillers and other postural coping mechanisms. Little is known about the effects of these self-care models and it's believed that they could even be detrimental to the unborn babies (Carvalho et al., 2017). The potential health risks associated with the use of different medical products and procedures made many pregnant mothers to opt for conservative management, such as physiotherapy, stabilization belts, nerve stimulation, acupuncture, massage, relaxation and physical exercise (Manyozo et al., 2019).

Reflexology foot massage is a holistic therapy that treats the person as whole rather than focusing on symptoms. This therapy is much more simple foot rubs or foot massage, it is powerful therapy, which has been shown to have a very positive effect on health and wellbeing (Samarehfekri et al., 2020).

In the past decades, the effectiveness of reflexology foot massage has been established through myriads of publications

and researches all over the world, but in most hospitals of developed countries, reflexology foot massage is considered a new approach of the integral part of PRLBP management. Nurses can have a key role in promoting health of pregnant woman by keeping abreast of current evidence-based information on PRLBP (Franke et al., 2017 .

The results of the current study revealed that there was no statistically significant difference in the basic data between the control and the study group in relation to age, level of education, occupation, current residence and marital status. These findings roll out the extraneous factors that might confuse the effect of foot reflexology massage .

The current study results also revealed a statistically significant difference among women of study group after application of three sessions of foot reflexology massage. Pain relief is more obvious after second and third session as foot reflexology massage has cumulative effect (Shady & Ali, 2019). Moreover, as foreseeable the results of the current study revealed that there was no statistically significant difference among subjects of control group before and after three sessions of foot reflexology massage. The results of the current study are congruent with the findings of the study conducted by Hughes et al. (2018), titled " The use of complementary and alternative medicine (CAM) for pregnancy related low back and/ or pelvic girdle pain: An online survey" which found that that more than four fifths of pregnant women received foot reflexology massage exhibit less low back pain intensity than those who do not receive it

Accordingly, the current study results showed decreased pain intensity & increased functional abilities among pregnant women of study group compared to control group after application of foot reflexology massage. These results were similar to findings of the study conducted by (de Oliveira et al., 2017), titled " Foot Reflexology Induces Analgesia in Elderly Individuals with Low Back Pain: A Randomized, Double-Blind, Controlled Pilot Study " which revealed that foot reflexology reduces LBP and increases functional abilities among elderly individuals with LBP.

Conclusion:

It can be concluded from the present study results that:

Pregnant women underwent a course of reflexology foot massage had significant decrease of low back pain intensity& increased functional abilities. Therefore, reflexology can be a cost-effective independent nursing intervention and a new useful safe method that can be used to decrease pregnancy related low back pain (PRLBP) intensity which in turn will improve the quality of life for pregnant women. Thus, it can be encouraged as a beneficial non-medical approach in obstetric practice.

Recommendations:

In line with the findings of the study, the following recommendations are made:

1. Nursing education institutions

Incorporate the technique in clinical nursing curricula, so that students will be trained to use it as integral component of care provided to pregnant women in different health care settings. Subsequently, pregnant women can apply self – foot reflexology massage to benefit its cumulative effects at home

2. Clinical obstetric settings

- Approach the administrative personnel of health care settings, in order to raise their awareness about the benefits of reflexology to pregnant women suffering from PRLBP so that they incorporate with pre service and in-service training of nurses to enable them to use it as non-pharmacological method for PRLBP.
- Providing audiovisual materials for pregnant women so they can learn the technique easily
- Educational institutions.

3. Mass Media

- Mass media Sector could integrate the issue in TV medical programs to raise public awareness about the effectiveness of foot reflexology on PRLBP

Table (1): **Number and percent distribution of the study participants according to their Socio-demographic characteristic**

Socio-demographic characteristic	Control group (n = 45)		Study group (n = 45)		χ²	P
	No.	%	No.	%		
Age (years)						
<25	26	57.80	22	48.90	0.714	0.398
≥25	19	42.20	23	51.10		
Min. – Max.	20.0 – 30.0		20.0 – 30.0		t= 0.806	0.422
Mean ± SD.	23.87 ± 2.76		24.38 ± 3.24			
Median	24.0		25.0			
Level of education						
Illiterate	6	13.30	5	11.10	0.797	MCp= 1.000
Read /Write	1	2.20	2	4.40		
Primary/ Preparatory	4	8.90	5	11.10		
Secondary	31	68.90	30	66.70		
University	3	6.70	3	6.70		
Postgraduate	0	0.00	0	0.00		
Occupation						
Housewife	42	93.30	42	93.30	0.0	FEp= 1.000
Working	3	6.70	3	6.70		
Current residence						
Urban	41	91.10	40	88.90	0.123	FEp= 1.000
Rural	4	8.90	5	11.10		
Marital status						
Married	45	100.00	45	100.00	–	–
Divorced	0	0.00	0	0.00		
Widow	0	0.00	0	0.00		

SD: **Standard deviation**   **t: Student t-test** χ^2: **Chi square test**
MC: **Monte Carlo**   FE**: Fisher Exact**
p: p value for comparing between the studied groups

Table (2): Number and percent distribution of the study participants according to pregnancy related low back pain intensity with visual analog scale (VAS)

Visual analog scale (VAS)	Control group (n = 45) First session Before No.	%	After No.	%	Second session Before No.	%	After No.	%	Third session Before No.	%	After No.	%	Study group (n = 45) First session Before No.	%	After No.	%	Second session Before No.	%	After No.	%	Third session Before No.	%	After No.	%	First session Test of Sig.(p_1)	Test of Sig.(p_2)	Second session Test of Sig.(p_1)	Test of Sig.(p_2)	Third session Test of Sig.(p_1)	Test of Sig.(p_2)
No pain (0)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	7	15.60						
Mild pain (1-3)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	12	26.70	12	26.70	37	82.20	37	82.20	34	75.60						
Moderate pain (4-6)	39	86.70	39	86.70	39	86.70	39	86.70	34	75.60	34	75.60	37	82.20	25	55.60	25	55.60	5	11.10	5	11.10	4	8.90	χ^2=0.338 (0.561)	χ^2=15.348* (<0.001*)	χ^2=15.348* (<0.001*)	χ^2=77.156* (^{MC}p <0.001*)	χ^2=63.136* (<0.001*)	χ^2=89.028* (^{MC}p <0.001*)
Severe pain (7-9)	6	13.30	6	13.30	6	13.30	6	13.30	11	24.40	11	24.40	8	17.80	8	17.80	8	17.80	3	6.70	3	6.70	0	0.00						
Unbearable pain (10)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00						
MH (p_0)	0.0 (1.000)				0.0 (1.00)				0.0 (1.00)				18.0* (0.001*)				50.0* (<0.01*)				17.0* (<0.01*)									
Min. – Max.	4.0 – 7.0		4.0 – 7.0		4.0 – 8.0		4.0 – 8.0		5.0 – 9.0		5.0 – 9.0		4.0 – 9.0		3.0 – 8.0		3.0 – 8.0		1.0 – 7.0		1.0 – 7.0		0.0 – 6.0		U= 807.0 (0.078)	U= 751.5* (0.027*)	U=503.0* (<0.001*)	U=232.0* (<0.001*)	U=158.0* (<0.001*)	U=24.0* (<0.001*)
Mean ± SD.	5.0±0.90		4.87±0.97		5.56±1.12		5.56±1.12		6.33 ±1.09		6.33 ±1.09		5.69±1.72		4.58±1.60		4.58±1.60		3.13±1.49		3.13 ±1.49		1.31 ±1.28							
Median	5.0		5.0		5.0		5.0		6.0		6.0		5.0		4.0		4.0		3.0		3.0		1.0							
Z (p_0)	1.897(0.058)				0.0 (1.000)				0.0 (1.000)				6.412* (<0.001*)				6.035* (<0.001*)				6.055* (<0.001*)									

SD: **Standard deviation**   U: **Mann Whitney test**   Z: **Wilcoxon signed ranks test**
χ^2: **Chi square test**   MC: **Monte Carlo**   MH: **Marginal Homogeneity Test**
p_0: p value for comparing between **pre** and **post** in each other group
p_1: p value for comparing between the studied groups in **pre**
p_2: p value for comparing between the studied groups in **post**
*: Statistically significant at $p \leq 0.05$

Table (3): **Number and percent distribution of the study participants according to total score of Oswestry low back pain disability interview schedule**

Oswestry low back pain disability questionnaire	Control group (n = 45)				Study group (n = 45)				Test of Sig.(p1)	Test of Sig.(p2)
	Before		After		Before		After			
	No.	%	No.	%	No.	%	No.	%		
No disability (0 – 4)	0	0.00	0	0.00	0	0.00	7	15.60		
Mild disability (5 – 14)	0	0.00	0	0.00	0	0.00	33	73.30		
Moderate disability (15 – 24)	33	73.30	38	84.40	37	82.20	5	11.10	1.029 (0.310)	χ^2=84.250[*] (<0.001[*])
Severe disability (25 – 34)	12	26.70	7	15.60	8	17.80	0	0.00		
Complete disability (35 – 50)	0	0.00	0	0.00	0	0.00	0	0.00		
MH (p0)	0.00 (0.059)				70.500[*] (<0.001[*])					
Total Score										
Min. – Max.	16.0 – 37.0		16.0 – 37.0		16.0 – 34.0		4.0 – 15.0			
Mean ± SD.	22.40 ± 4.01		22.22 ± 5.03		22.98 ± 4.40		9.42 ± 3.19			
Median	23.0		22.0		22.0		9.0		U=100.0 (0.919)	U=0.0[*] (<0.001[*])
Percent Score										
Min. – Max.	32.0 – 74.0		32.0 – 68.0		32.0 – 68.0		8.0 – 30.0			
Mean ± SD.	44.80 ±8.02		44.44 ±10.06		45.96 ± 8.80		18.80 ± 6.33			
Median	46.0		44.0		44.0		18.0			
Z (p0)	0.212 (0.832)				5.861[*] (<0.001[*])					

SD: **Standard deviation** U: **Mann Whitney test** Z: **Wilcoxon signed ranks test**
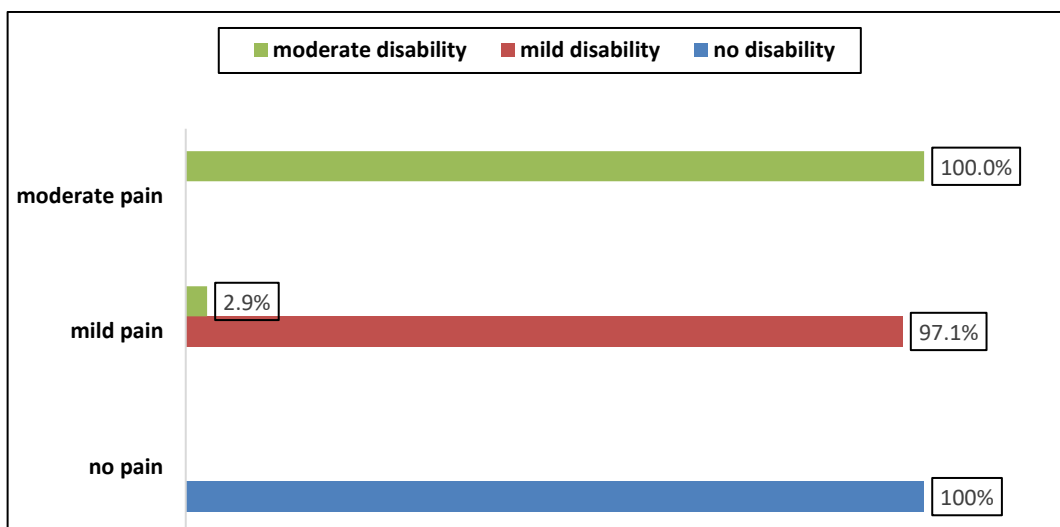χ^2: **Chi square test** MH: **Marginal Homogeneity Test**

Figure (1): Correlation between low back pain intensity and low back pain disability after intervention in third session among the study group.

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