Effect of Foot Reflexology on Post-Cesarean Pain

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Abstract:
Background: With the dramatic rise in the rate of cesarean deliveries in the last two decades, postoperative pain management of these mothers has become a major nursing challenge. Although advances have been made in the understanding of pathophysiology of pain and development of new analgesics and delivery techniques, many women still suffer from moderate to severe post-cesarean pain. Reflexology is one of the used non-pharmacological therapies in pain practice but its effect on post-cesarean pain still under investigated in obstetric nursing practice. Therefore the aim of this study was to determine the effect of reflexology on post-cesarean pain. To fulfill the study aim a quasi experimental research design was used.
Hypothesis: Mothers who receive foot reflexology (independent variable) show decreased post-cesarean pain intensity (dependent variable) than who do not receive the intervention.
Setting: The study was conducted at the postnatal cesarean ward of El-Shatby Maternity University Hospital in Alexandria Governorate.
Subjects: The study Subjects were selected by using the non probability sampling technique where a purposive sample of 70 post cesarean section women were recruited according to inclusion criteria. The study subjects were equally assigned to one of two groups: a control and experimental group. Each group comprised 35 women.
Tools of the study: Three tools were used for data collection. Socio-demographic & clinical profile structured interview schedules, Johansson Pain-0- Meter Scale (JPOM) and a modified version of Chamber Price pain rating scale (CPPRS)
Finding: Reflexology after cesarean section appears to have a remarkable effect on post-cesarean pain quality as measured by JP0MS i.e. affective and sensory pain responses (as reflected by Pain – rating Index rank) were significantly lowered after intervention. Reflexology after cesarean section was likely to have an outstanding decline in intensity of post-cesarean pain as measured by CPPRS. i.e. behavioral manifestation or responses to post-cesarean pain significantly decreased among women after application.
*Based on the findings of the present study, it can be **concluded** that foot reflexology can be a cost effective independent nursing intervention and a new useful safe method that can be used to decrease post-cesarean pain which in turn will improve the quality of women's post-cesarean experience. Thus, it can be encouraged as a beneficial non-medical approach in obstetric practice.*
Recommendations are suggested; reflexology should be advocated as a non-pharmacological approach for management of post-cesarean pain and it should be recommended in hospital protocols with enough training should be disseminated for obstetric nurses and midwifes to utilize the reflexology for obstetric indications, since it is non-invasive, efficient and easy to use. Further researches are recommended where replication of the current study on a larger population size and different settings for the purpose of better generalization. And assessment of women's satisfaction with the use of non-pharmacological techniques for management of post-cesarean pain, especially reflexology
Keywords: Foot reflexology, Cesarean pain, non- pharmacological methods of pain relieve

I. Introduction

Childbirth is a crucial experience in a woman's life and is painstaking bio-psychosocial occasion. This experience shapes how mother will build good self-efficacy, constructive feelings for the newborn, and a smother modification to be a mother as well as the background experience for future births. This central event in any woman's life withers a vaginal birth or a surgical delivery by cesarean section has the ultimate goal of preserving the mother's life and safely giving birth to her baby. [1]

Two decenniums and over; the number of cesarean births being performed has increased dramatically. [2] Through the last seventy years, this surgical birth has augmented over ten-folds. In several regions around the

world, its incidence is reported to exceed sixty percent. [3, 4] In Egypt, more than fifty percent of women give birth by C-section, according to the 2014 Egyptian Demographic and Health Survey (EDHS). This rate is about three folds higher than it should be. [4] Consequently, cesarean birth turned out to be a health priority of the obstetric community and nursing care offered to women going thru it expanded enormously. [5]

One of the major challenging issues in obstetric nursing is the management of post-cesarean pain. Compared to vaginal delivery, mothers giving caesarean birth describe more severe pain during the first few days, and persistent pain that continue six months to one year following labor. Pain amongst all the several complaints suffered by mothers going through caesarean birth, is a complicated phenomena. [6] Post-caesarean pain has two mechanisms somatic and visceral. Somatic pain coming up from neural receptors within the abdominal wound has both coriaceous and deep compounds. Also, visceral uterine neural stimuli are conveying pain. Both mechanisms ascend pain to the spinal cord passing through the T10-L1 spinal fibers. These pains are quit unlike; somatic pain is confined, whereas the visceral pain is recognized as diffuse one. [7]

Nursing management for post-cesarean pain is unique as mothers are anticipated to retrieve effort quickly to get their maternal role for the neonates within hardly any time next the surgical birth. Regrettably, pain intolerance prejudice the mother's capability to optimally take care for her newborn in the immediate postpartum period and may unfavorably influence maternal/infant bounding and attachment. Furthermore, pain and anxiety may also affect negatively the mother's attitude toward exclusive breast-feed. On the other hand, proper and effective pain management quietly facilitates early mobilization witch in its turn reduces the risk of thrombo-embolic diseases, which may occur as a sever post-partum complication.[8] In addition, short time of recovery post-cesarean reduces many other somatic and emotional problems that hinder cost reserves and positive experience of child birth. [9]

Pharmacological pain relive methods used post-cesarean are a great constrain for obstetric nurses. Since the expand use of medications cause numerous unfavorable effects including; nausea and vomiting as well as a delay in hospital discharge. Moreover, narcotics which can be used as a painkiller can be secreted in breast milk and cause sedation to the neonate as well. [10]

Therefore it is crucial, that method used for post-cesarean pain management should be safe, efficient and does not interfere with the mother's ability to mobilize and care for her newborn. It shouldn't affect neonate in breast-feeding mothers. Thus, managing this distinctive kind of pain with harmless, easy and effective pain-relieving method through empirical evidence is a requisite. [7]

Non-pharmacological pain relief method is a good option for the obstetric nurse to manage post-caesarean pain. Examples of those methods include massage, relaxation techniques, calming music, mind-body practices, herbal remedies, mentalism, and therapeutic touch. Such techniques have verified their efficiency in soothing pain level. [11]

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 [12].
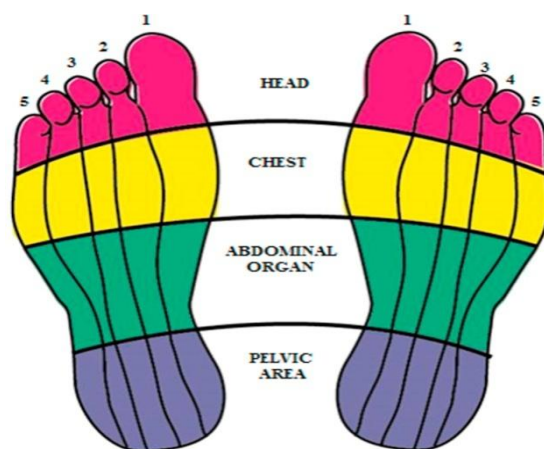
Besides, researchers proposed that the gate control theory of pain could be one of the hypotheses underling reflexology. Where non- distressing stimulus through large measurement nerve fibers (taping, pressure, trembling) convey inputs and close the "gates" to those painful ones, which stops pain senses from

initiating to the central nervous system. Therefore, stimulation by non- destructive contribution is able to repress pain [13, 14].

Significance of the study

When reflexology procedures are integrated as an element of postsurgical (Post-Cesarean) protocol; less pharmacological drug may be desired, with the added benefit of hardly any adverse effects [14]. However, the effect of reflexology on pain generally and during pregnancy and labor particularly have been extensively studied, but there is still lack of evidence to support its effectiveness in relieving post-cesarean pain. The present study was conducted to determine the effect of foot reflexology on post-cesarean pain in an attempt to provide sound research findings in relation to using new nursing strategies to help mothers post-cesarean to retrieve their maternal role of caring for their newborns, families and themselves.

II. Materials and Method

MATERIALS
Research design

This is a quasi experimental research design, where the effect of reflexology (independent variable) on post-cesarean pain intensity (dependent variable) was examined. Both manipulation and control were utilized.

Hypothesis

Mothers who receive foot reflexology (independent variable) show decreased post-cesarean pain intensity (dependent variable) than who do not receive the intervention.

Setting

This study was conducted at the postnatal cesarean section ward of El-Shatby Maternity University Hospital in Alexandria Governorate. This hospital was particularly chosen because cesarean section turnover is suitable for the study and the women attending this hospital have nearly the same socio-economic status which maintains homogeneity of the study sample. In addition that sufficient staff cooperation to employ the intervention is geared with no real obstacles since it is an educational hospital.

Subjects

A purposive sample of 70 post cesarean section women who were available at the time of data collection were recruited from the above mentioned setting. Subjects were selected by using the non probability sampling technique according to the following inclusion criteria which guarantee homogeneity of the sample:
- Conscious.
- With intact foot skin and free from arthritis, phlebitis, burn wound, injury, inflammation and eczema
- Using the same type of anesthetize
- Primiparous, delivered a full term baby
- Free from any medical disease
- With normal course of pregnancy
- Willing to participate in the study
  The Epi info 7 statistical program was used to estimate the sample size using the following parameters:
- Population size =780 over 2 months
- Expected frequency= 50%
- Acceptable error= 10%
- Confidence coefficient= 95%
- Minimal sample size =67
  The selected subjects were equally assigned to one of two groups: a control and experimental group. Each group comprised 35 women.

Tools

Three tools were used for data collection:

Tool I: Socio- demographic, and clinical profile structured interview schedule.
This tool was developed and used by the researcher to elicit basic data about subjects as follows:
1. Soico-demographic characteristics including: age, level of education, occupation, residence and marital status.
2. Clinical profile including; present history: weeks of gestation, type of anesthesia, vital signs

Tool II: A modified version of Johansson Pain - O- Meter scale (JPOM):
It was originally developed by Johansson, 1973. It was adopted and used by the researcher after translation to suit the Egyptian culture .It was used to measure the intensity of sensory and affective components of pain. It is composed of 12 sensory and 11 affective pain word descriptors. Sensory pain words are rated as follows: cutting (5), tearing (5), sharp (5), burning (4), cramping (4), pressing (4), aching (4), gnawing (3), pinching (3), stinging (2), pricking (2) and sore (1). Affective pain words are rated as follows: torturing (5), killing (5), suffocating (5), terrifying (5), dreadful (4), fearful (4), troublesome (3), tiring (3), irritating (2), nagging (1) and happy (0).

The woman's choice of words was calculated to determine pain intensity. A pain rating index rank (PRIR) was used based on accumulation of numerical values assigned to the chosen words.

PRIR was scored as follows:
* 0 representing no pain
* 1-3 representing mild pain
* 4-6 representing moderate pain
* 7-10 representing severe pain
* More than 10 representing intolerable pain

Tool (III): A modified version of Chamber Price Pain Rating scale (CPPRS).
It was originally developed by Chambers Price; 1967. It was adopted and used by the researcher after translation to suit the Egyptian culture. It was used to measure the behavioral responses to pain. It includes four dimensions: posture, gross motor activity, facial expression and verbalization. For each of these four major behavioral responses one of a three alternative choices was elicited by the researcher. For posture, the choice is between very relaxed, guarded and tense posture. For gross motor activity, the choice is between very restless, slightly restless and quiet. For facial expression, the choice is between no frowning, some frowning and constant frowning or grimacing. Finally, women's verbalization varies between normal no sound, groans/moans and cries/sobs.

Each of the 12 alternatives was scored as (0, 1, and 2). The total score ranges from 0-8. This score was translated to the corresponding pain intensity as follows:
* No pain (0)
* Mild pain (1-2)
* Moderate pain (3-4)
* Severe pain (5-6)
* Unbearable pain (7-8)

III. Method
The study was executed according to the following steps:
1. An Official letter from the Faculty of Nursing, Alexandria University was submitted to the responsible authorities of the study setting to take their permission for data collection after explanation of the purpose of the study.
2. Tool I was developed by the researcher after extensive review of recent and related literature and reviewed for content validity by a jury of five experts in the field.
3. Tools II, III were adopted and translated into Arabic language. They were tested for content validity by a jury of five experts in the field.
4. Tools reliability was tested by Alpha Cronbach test (internal consistency) and results were satisfactory (0, 78).
5. A pilot study was carried out on 10 women who were excluded from the main study sample. The main purposes of the pilot study were to:
* Ascertain clarity, relevance and applicability of the tools.
* Estimate the time needed to complete the sheet.
* Detect any problem peculiar to the tools.

The pilot study revealed that:
* The tools were clear, relevant and applicable
* Each interview took approximately 30- 40 minutes.
* No problem that interfered with the process of data collection was detected.
6. **Ethical considerations:**
* The researcher attended a training workshop on how to conduct foot reflexology massage at The Females' Faculty of sport, Alexandria University and an accredited certificate was obtained.

- Each woman was individually contracted and informed about the aim of the study in order to obtain her informed consent. Again, each of those who agreed to participate was assured about confidentiality, privacy and right to withdraw at any time.

7. Field of work:
Data of tool (I) was collected through interviewing the women during the 1st postpartum day.

The control group included 35 women who received post cesarean section hospital routine administration of pain medication in addition to the researcher's physical presence.

The study group comprised 35 women upon whom reflexology was applied by the researcher. The interventions were applied within the first four to six hours interval after cesarean. *The reflexology technique was conducted according to the following steps:*
- The mother's foot was elevated by supporting it with a pillow. The sole was spread and rubbed by the researcher's fingers.
- The thumb was used to make circles over the entire sole of the foot. Then the researcher rubbed the sole with an up-and-down motion.
- The heel and ankle was pressed between the researcher's thumb and forefinger. This is done to lukewarm the skin of the foot generating rest and increasing blood flood.
- The mentioned kneading was applied to each foot for 5 minutes, then reflexology is done through acupressure, applying the proper amount of pressure to the sphere of the foot, on the following points;

Two Yin Crossing:
This point is situated three inches widths over the ankle. Pressing this point assists in overall healing of disorders related to the lower abdomen.

http://www.innerpath.com.au/acupuncture/Acupressure-points.html

Great Rushing:
This point is positioned in the girdle between the large and the second toes. Stimulating this spot aids in reducing abdominal pain.

http://www.innerpath.com.au/acupuncture/Acupressure-points.html

- The pillow support was removed to finish the massage.

Using tool II and III pain intensity was assessed for the experimental and control groups two times: once before applying the session and the 2nd time immediately after it.

Collection of data consumed 4 months starting from mid April 2018 till the end of June 2018.

The control group was started with and completed before starting the study group to avoid contamination of the sample.

8. Statistical analysis of the data
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. The difference

sample test, independent t-test, Wilcoxon test, Friedman's test, chi-square test and fissure exact test. Five percent level of significance was used to find out the statistical significant difference of the results.

Comparison between the study and control groups was done to identify the effect of reflexology on post-cesarean pain intensity.

IV. Results
The results of this study will be presented according to the following headings:
1 - <u>General characteristics</u>:
- Socio-demographic data

2 - <u>Present history</u>
- Vital signs

3- <u>Post-cesarean pain intensity before and after routine hospital care and before and after intervention as measured by</u>:
- A modified version of Johansson pain -o- meter scale (JPOM)
- A modified version of Chamber Price pain rating scale (CPPRS).

1- General characteristics of the study subjects
- **Socio - demographic characteristics:**

Table (1) shows the number and percent distribution of the control and the experimental groups according to their socio-demographic characteristics. Regarding *age*, it was observed that the mean age was almost the same (28.46±5.75and 28.89±5.58years) among the control and experimental groups respectively. More than one half (51.50%) of the control group age was between 20-30 years old while 45.80% of the experimental group had the same age.

Concerning *level of education*, it was obvious 17.10% and 25.70% of the control group and the experimental groups respectively were illiterate. Moreover, (22.90%) of the control group and 31.40% of the experimental group could just read and write. In addition, more than one third (37.40%) of the control and 11.40% of the experimental groups respectively had secondary education. However, an equal percent 11.40 % of the control group had preparatory and university education compared to (28.4% & 2. 90%) of the experimental group respectively.

The table also shows that the majority (91.40%) of the control and experimental groups respectively were *housewives*. While, (8.60%) of the control and experimental groups respectively were *working*

As regards to *current residence*, it was noticed that 74.30% and 68.60% of the control and experimental groups respectively were **urban** dwellers

All women in both study groups were married

No statistically significant difference was found among the two groups in relation to their socio-demographic characteristics

Table (1): Number and percent distribution of the study subjects according to their socio- demographic characteristics

Socio-demographic characteristics	Control group		Experimental group		F/x^2 (P)
	No n=35	%	No n=35	%	
Age:					
< 20	5	14.20	3	8.60	$x^{2}=11.437$
20-30	18	51.40	19	45.80	(0.908)
> 30	12	34.20	13	45.60	
Mean+SD	28.46 +5.75		28.89 + 5.58		
Level of education					
- Illiterate	6	17.10	9	25.70	$x^{2}=5.734$
- Read & Write	8	22.90	11	31.40	
- Primary & preparatory	4	11.40	10	28.60	(0. 17)
- Secondary	13	37.20	4	11.40	
- University	4	11.40	1	2.90	
Working condition:					$x^{2}=1.000$
- Housewife	32	91.40	32	91.40	
- working	3	8.60	3	8.60	(0.663)
Current residence:					$x^{2}=0.280$
- Rural	9	25.70	11	31.40	
- Urban	26	74.30	24	68.60	(0.597)

x^2: Chi-Square Test

*: Significant at P ≤0.05

- **Present history**

Table (2) clarifies the mean distribution of the control and the experimental groups according to their vital signs. It can be observed that both the control and the experimental groups were relatively similar, where the mean pulse was 79.20±6.53 & 78.94±6.82 b/m respectively, the **mean systolic** BP was 113.14±11.31&112.29 ±11.90 mmHg respectively; the **mean diastolic** BP was 73.00 ± 9.56 & 72.29 ± 9.26 mmHg respectively; the **mean respiration** was18.57±1.06 & 18.74±1.03 c/m respectively and the **mean temperature** was37.10±0.24 & 37.07±0.24°C respectively. **Accordingly,** *no statistically significant difference* was observed between the two groups concerning their vital signs, where P= (0.9487, 0.7970, 0.2468, 0.3043, 0.5727) respectively

Table (2): Mean distribution of the study subjects according to their mean vital signs

Mean vital signs	control group	Experimental group	t (P)
	No n= 50	No n= 50	
	Mean ± SD	Mean ± SD	
Pulse rate	79.20±6.53	78.94±6.82	T=0.0644 P=0.9487
Systolic blood pressure	113.14±11.31	112.29±11.90	T= 0.2579 P= 0.7970
Diastolic blood pressure	73.00±9.56	72.29±9.26	T=1.1652 P=0.2468
Respiratory rate	18.57±1.06	18.74±1.03	T=1.0328 P=0.3043
Body temperature	37.10±0.24	37.07±0.24	T=0.5659 P=0.5727

t (P): t-test &P for t-test
*: Significant at P ≤0.05

Table (3) illustrates percent distribution of the control and experimental groups according to their sensory pain description as measured by JPOM. *Before the session of intervention (4-6 hours post operative):* both groups had almost similar description. However, *immediately and one hour* after intervention a dramatic drop was observed among the experimental group in relation to the following descriptions: cutting, burning & prickling, sharp &prickling, sharp &burning ,cutting &burning responses decreased from (2.9%, 8.6 %, 8.6%, 5.7%, 17.1%) respectively before intervention to 0% immediately and 1 hour after intervention.

Sharp and cramping description decreased from 8.6% before intervention to 5.7% and 2.9% immediately and one hour after intervention respectively

Tearing, burning & pressing description decreased from 8.6% before intervention to 2.9% immediately and to 0% one hour after intervention

Cutting and tearing description decreased from 8.6% before intervention to 2.9% immediately and one hour after intervention

On the other hand, slight increase was observed among the control group immediately and one hour after routine hospital care in relation to the following descriptions:

Sharp description for pain increased from 8.6% before routine hospital care to 11.4% immediately after and 8.6 one hour it.

Burning description increased from 14.3% before routine hospital intervention and immediately to 20%1 hour after this management Sharp & burning increased from 5.7% before routine care to 8.6% immediately after and 11.4% one hour after it.Cutting &burning increased from 8. 6% before & immediately after routine care to 11.4% one hour after this hospital care.

Table (3): Percent distribution of the control and experimental groups according to their sensory pain description as measured by modified version of Johansson pain O- Meter scale (JPOM) before and after intervention

Sensory pain description using JPOM	Scoring of description	Time of intervention											
		Control group						Study group					
		Before routine hospital care (4-6 hours after operation)		Immediately after routine hospital care		One hour after routine hospital care		Before intervention (4-6 hours after operation)		Immediately after intervention		One hour after intervention	
		n= 35	%	n= 35	%	n= 35	%	n= 35	%	n= 35	%	n= 35	%
Cutting	5	2	5.7	2	5.7	1	2.9	1	2.9	-	-	-	-
Tearing	5	1	2.9	1	2.9	1	2.9	-	-	-	-	1	2.9
Sharp	5	3	8.6	4	11.4	3	8.6			-	-		
Burning	4	5	14.3	5	14.3	7	20	5	14.3	6	17.1	4	11.4
Cramping	4	-	-	-	-	-	-	-	-	1	2.9	1	2.9
Pressing	4	-	-	-	-	-	-	-	-	-	-	-	-
Aching	4	2	5.7	2	5.7	2	5.7	1	2.9	2	5.7	4	11.4
Gnawing	3	-	-	-	-	-	-	-	-	-	-	-	-
Pinching	3	-	-	-	-	-	-	-	-	1	2.9	1	2.9
Stinging	2	-	-	-	-	-	-	-	-	3	8.6	3	8.6
Pricking	2	-	-	-	-	-	-	-	-	10	28.6	10	28.6

CONT. Table (3): Percent distribution of the control and experimental groups according to their <u>sensory</u> pain description as measured by modified version of Johansson pain O- Meter scale (JPOM) before and after intervention

Sensory pain description using JPOM	Scoring of description	Time of intervention											
		Control group						Experimental group					
		Before routine hospital care		Immediately after routine hospital care		One hour after routine hospital care		Before intervention		Immediately after intervention		One hour after Intervention	
		n= 35	%	n= 35	%	n= 35	%	n= 35	%	n= 35	%	n= 35	%
Sore	1	-	-	-	-	-	-	-	-	5	14.3	5	14.3
Burning &pricking	6	2	5.7	2	5.7	1	2.9	3	8.6	-	-	-	-
Cramping &pricking	6	-	-	-	-	-	-	1	2.9	-	-	-	-
Sharp &pricking	7	2	5.7	1	2.9	2	5.7	3	8.6	-	-	-	-
Sharp &burning	9	2	5.7	3	8.6	4	11.4	2	5.7	-	-	-	-
Cutting &burning	9	3	8.6	3	8.6	4	11.4	6	17.1	-	-	-	-
Tearing &burning	9	3	8.6	5	13.13	3	8.6	2	5.7	3	8.6	3	8.6
Sharp &cramping	9	2	5.7	2	5.7	1	2.9	3	8.6	2	5.7	1	2.9
Cutting &tearing	10	4	11.4	4	11.4	3	8.6	3	8.6	1	2.9	1	2.9
Tearing, burning & pressing	13	2	5.7	-	-	1	2.9	3	8.6	1	2.9	-	-
Cutting , tearing &burning	14	2	5.7	1	2.9	1	2.9	2	5.7	-	-	1	2.9

Table (4) clarifies distribution of the experimental and control groups according to their sensory pain description as measured by modified version of Johansson pain O- Meter scale (JPOM), reflected by sensory pain rating index- before and after intervention.

Before the intervention both groups had almost similar scores with **no** *statistically significant difference was*

Found between the control and experimental groups
Immediately after intervention, unbearable pain decreased sharply from 14.3% to 2.9% among the experimental group, in the main while the decrease was also observed among the control group, from 11.4% to 2.9%. But the difference between both groups was clearly observed among women with sever pain. Where severe pain dropped sharply from 54.7% to 17.4% among the experimental group, on the contrary it increased from 45.7% to 54.4% among the control group. In addition, moderate pain decreased from 31.4% to almost one quarter (25.7%) among the experimental group, on the other hand it increased from 42.9% to 45.7% among the control group. Although none of the two groups experienced mild pain before intervention, yet, 54.3% of the experimental group reported having such pain immediately after intervention, compared to 0% of the control group. *This finding can be explained as the women in the experimental group reported such lower level of pain instead of more sever forms, where the same result was not observed among the control group. A highly statistically significant difference was found between the control and experimental groups in relation to mean total score of pain p=0.000.*

one hour after intervention, further decrease in severe pain was observed among the experimental group from 17.1 % to 14.3% and unbearable pain remained the same (2.9%), while unbearable pain was increased from 2.9% to 5.7% among the control group. whilst, mild pain remained the same among both experimental and control groups (54.3% compared to 0% respectively). *A highly statistically significant difference was found between both groups in relation to mean total score of pain p=0.000.*

Moreover, *another highly significant difference* was also detected among women of the experimental group before & after intervention in relation to their intensity of post-cesarean pain as measured by JOPM (sensory response), where (P =0.000). On the opposite no statistically significant difference was detected among women in the control group before and after foot reflexology immediately or after one hour. Accordingly, it can be deduced that the foot reflexology had a significant effect in reducing post-cesarean pain intensity among women within the experimental group compared to the control group.

Table (4): Percent distribution of the experimental and the control groups according to their <u>total score of sensory pain description</u> as measured by modified version of Johansson pain O- Meter scale (JPOM), reflected by sensory pain rating index rank- before and after intervention

| Mean Sensory pain rating index rank using JPOM	Time of intervention												F/x²(p) between Experimental &control groups
	Control group						Experimental group						
	Before routine hospital care		Immediately after routine hospital care		One hour after routine hospital care		Before intervention		Immediately after		One hour after intervention		
	n=35	%	n=35	%	n=35	%	n=35	%	n=35	%	n=35	%	
No pain (zero)	-	-	-	-	-	-	-	-	-	-	-	-	Befor intervention P3=0.984 (0.612)
Mild pain (from 1 to 3)	-	-	-	-	-	-	-	-	19	54.3	19	54.3	
Moderate (from 4 to 6)	15	42.9	16	45.7	16	45.7	11	31.4	9	25.7	10	28.6	Immediately after P4=24.982 (0.000)
Severe (from 7 to 9)	16	45.7	18	51.4	17	48.6	19	54.3	6	17.1	5	14.3	One hour after P5=26.952 (0.000)
Unbearable (10)	4	11.4	1	2.9	2	5.7	5	14.3	1	2.9	1	2.9	
Z (P) before /after Within each group	P1c= 0.325 (0.984) P2c= 0.206 (1.265)						P1e= 4.807 (0.000)* P2e= 4.877 (0.000) *						

X^2(p):chi-square test &p for X^2 FET (P): Fisher Exact Test & P for FET-Test   Z: Wilcox on test
(p1e): significant test before and immediately after intervention for the study group
(p2e): significant test before and one hour after intervention for the study group
(p1c): significant test before and immediately after intervention for the control group
(p2c): significant test before and one hour after intervention for the control group
(P3): significant test before foot reflexology between study and control groups

(P4): significant test immediately after foot reflexology between study and control groups
(P4): significant test one hour after foot reflexology between study and control groups
*: significant at p≤0.05

  Fig. 1: illustrates the mean post-cesarean pain intensity as measured by modified version of Johansson pain O-Meter scale (sensory pain description) across three time measures before and after intervention in the control group and experimental group using Friedman's test. . A difference was observed across three times measures. The mean pain score was 2.89 before intervention, diminished to 1.57 & 1.45 immediately & one hour after intervention respectively. On the contrary the mean score of pain increased among the control group from 2.20 before intervention to 2.44 and 2.87 immediately and one hour after intervention respectively. *A highly statistically significant difference* was detected among women of the experimental group, where (P =0.0000). Whereas, post-cesarean pain intensity was remarkably decreased after intervention. No difference was statistically detected among the control group
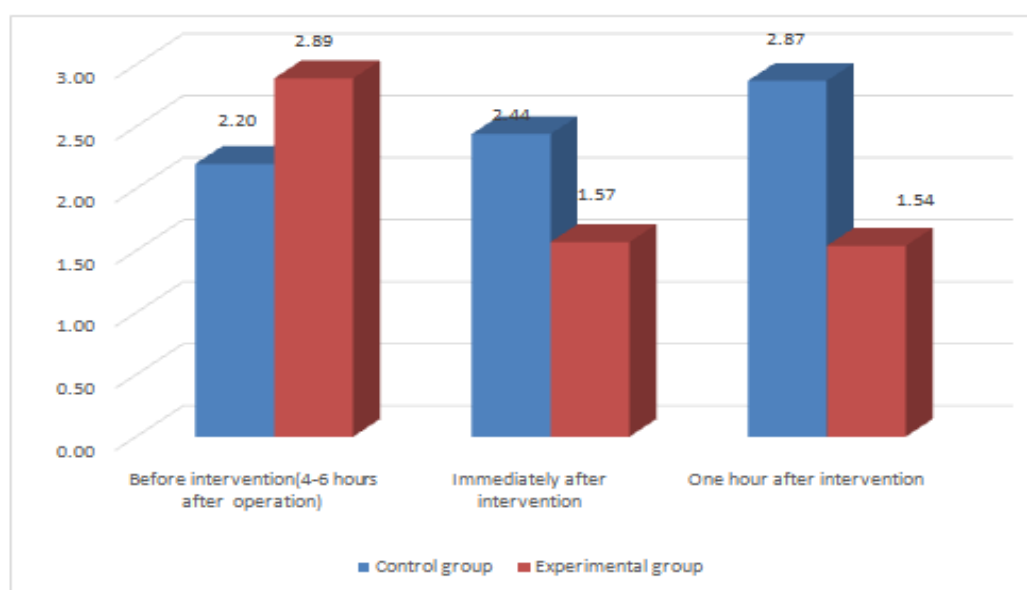
(X=55.386 p=0.000)* Experimental group   (x = 0.304, p =0.859) control group

Fig. 1: Mean post-cesarean pain intensity as measured by modified version of Johansson pain O- Meter scale (sensory pain description) across three time measures before and after intervention in the control group and experimental group using Friedman's test.

Table (5) shows percent distribution of the experimental and the control groups according to their affective pain description as measured by a modified version of Johansson Pain-O- Meter Scale (JP0MS). It can be observed that the most frequently reported affective descriptions **among the experimental group before the intervention** were: terrifying pain and dreadful pain 20%, followed by torturing pain, torturing& dreadful, torturing& terrifying were 14.3%, dreadful & fearful 11.4% and terrifying &dreadful 5.7%. These descriptions dramatically decreased **immediately and one hour after intervention**. Whereby they reached the following values:
        Dreadful, terrifying, torturing, dreadful& fearful, torturing& dreadful, torturing& terrifying and dreadful & fearful responses decreased respectively to (11.4%, 11.4%, 5.7%, 5.7%, 5.7%, 2.9 %) immediately after intervention and remained the same one hour   after intervention.

However another picture is observed among the control group receiving the routine hospital care. The table shows erratic affective pain descriptions among the control group before, immediately and 1hour after intervention in relation to the following descriptions: dreadful (22.9%), torturing & dreadful (20%) terrifying (17.1%) &, torturing& terrifying (14.3%), fearful and torturing & troublesome (2.9%)
        Torturing pain increased from 20 % before the routine hospital care to 22.9% immediately after intervention and 28.6% 1hour after intervention
Terrifying pain increased from17.1% before routine hospital care to 20% immediately after and remained the same after one hour
        But dreadful pain decreased from 22.9% before routine hospital care to 17.1% immediately after it and regains its increase to 22.6% one hour after the routine hospital care

Terrifying & dreadful pain deceased from 14% before routine hospital care to 8.6% immediately & 5.7% one hour after it

      Torturing& troublesome pain increased dramatically from 2.9 % before routine hospital care to 17.1% immediately after hospital management and 10% one hour after it.

      Torturing & dreadful pain decreased from 20 % before routine hospital care to 12% immediately after intervention and come back to increase reaching 14.3% one hour after hospital interference

Torturing & terrifying pain decreased from14.3 % before hospital management to 11.4% immediately after routine hospital care and 8.6% 1hour after it.

Table (5): Percent distribution of the control and the experimental groups according to their <u>affective</u> pain description as measured by modified version of Johansson pain O- Meter scale (JPOM) before and after intervention

Affective pain description using JPOM	Scoring of description	Time of intervention											
		Control group						Experimental group					
		Before routine hospital care		Immediately after routine hospital care routine hospital care		One hour after routine hospital care		Before intervention		Immediately after intervention		One hour after intervention	
		n=35	%	n=35	%	n=35	%	n=35	%	n=35	%	n=35	%
Torturing	5	7	20	8	22.9	10	28.6	5	14.3	2	5.7	2	5.7
Killing	5	-	-	-	-	-	-	-	-	-	-	-	-
Suffocation	5	-	-	-	-	-	-	-	-	-	-	-	-
Terrifying	4	6	17.1	7	20	7	20	7	20	4	11.4	5	14.3
Dreadful	4	8	22.9	6	17.1	8	22.6	7	20	4	11.4	1	2.9
Fearful	4	1	2.9	1	2.9	-	-	-	-	-	-	-	-
Troublesome	4	-	-	-	-	-	-	-	-	3	8.6	4	11.4
Tiring	3	-	-	-	-	-	-	-	-	10	28.6	7	20
Irritating	3	-	-	-	-	-	-	-	-	1	2.9	2	5.7
Nagging	2	-	-	-	-	-	-	-	-	5	14.3	4	11.4
Happy	2	-	-	-	-	-	-	-	-	-	-	-	-

CONT. Table (5): Percent distribution of the experimental and control groups according to their <u>affective</u> pain description as measured by modified version of Johansson pain O- Meter scale (JPOM) before and after intervention

Affective pain description using JPOM	Scoring of description	Time of intervention											
		4-6 h after surgery						12 h after surgery					
		Before routine hospital care		Immediately after routine hospital care		One hour after routine hospital care		Before intervention		Immediately after intervention		One hour after intervention	
		n=35	%	n=35	%	n=35	%	n=35	%	n=35	%	n=35	%
Dreadful &fearful	8	-	-					4	11.4	1	2.9	1	2.9
Torturing & troublesome	8	1	2.9	3	8.6	2	5.7	-	-	-	-	-	-
Terrifying &dreadful	9	-	-					2	5.7	1	2.9	1	2.9
Torturing& dreadful	9	7	20	6	17.1	5	14.3	5	14.3	2	5.7	2	5.7
Torturing& terrifying	10	5	14.3	4	11.4	3	8.6	5	14.3	2	5.7	6	5.7

Table (6) demonstrates the percent distribution of the experimental and the control groups according to their total score of affective pain description as measured by modified version of Johansson pain O- Meter scale (JPOM), reflected by affective pain rating index rank before and after the intervention. ***Before the intervention)***, more than one half (54.3%) of the experimental group had moderate pain compared to 62.9% of the control group. Meanwhile, 45.7% of the experimental group had severe pain compared to 37.1% of control group. None of the two groups had unbearable pain. ***No statistically significance was found between the control and experimental groups in relation mean total score of pain.***

Immediately after intervention, severe and moderate pain decreased from 48% to 28.6% and from 45.7% to 17.1% respectively among the experimental group, while they remained the same among the control group (62.9% & 37.1%) respectively. On the other hand, the decreased percent in moderate and sever pain among experimental group were shifted to the mild pain which increased from (0% to 54.3%) among women in the experimental group, while it remained the same among the control group. This result is a positive discrimination for the foot reflexology intervention. ***A highly statistically significant difference was found between the control and experimental groups in relation mean total score of pain p=0.000.***

1 hour after intervention, moderate& severe pain slightly increased from 28.6% to 22.4% and from 17.1% to 28.6% respectively among the experimental group, while moderate pain increased from 62.9% to 71.4% *and severe pain decreased from 37.1% to 28.6 among the control. This may be attributed to the need of re-demonstration of the foot reflexology intervention. **A highly statistically significant difference was found between the control and experimental groups in relation mean total score of pain p=0.000.***

Moreover, ***another highly significant difference*** was also observed among women of the experimental group before & after intervention in relation to their intensity of post-cesarean pain as measured by JOPM (affective response), where (P =0.000). On the contrary no statistically significant difference was detected among women in the control group before and after foot reflexology immediately or after one hour. Accordingly, it can be presumed that the foot reflexology had a significant effect in reducing post-cesarean pain intensity among women within the experimental group compared to the control group.
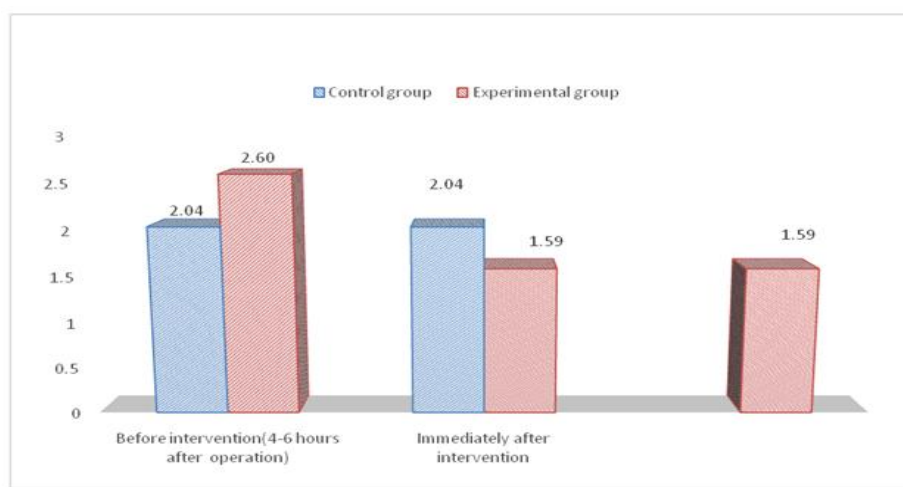
Table (6): Percent distribution of the experimental and control groups according to their <u>total score of affective</u> pain description as measured by modified version of Johansson pain O- Meter scale (JPOM), reflected by affective pain rating index rank before and after intervention

Affective pain rating index rank using JPOM	Time of intervention												F/x²(p) between Experimental &control groups
	Control group						Before intervention		Immediately after intervention		one hour after intervention		
	Before routine hospital care				One hour after routine hospital care								
	n=35	%	n=35	%	n=35	%	n=35	%	n=35	%	n=35	%	
No pain (zero)	-	-	-	-	-	-	-	-	-	-	-	-	Before intervention P3=0.520 (0.467)
Mild pain (from1to3)	-	-	-	-	-	-	-	-	19	54.3	17	48.6	
Moderate (from 4 to 6)	22	62.9	22	62.9	25	71.4	19	54.3	10	28.6	8	22.9	Immediately after intervention P4=22.870 (0.000)*
Severe (from 7 to 9)	13	37.1	13	37.1	10	28.6	16	45.7	6	17.1	10	28.6	One hour after intervention P5=20.497 (0.000)*
Unbearable (10)	-	-	-	-	-	-	-	-	-	-	-	-	
Z (P) before /after Within each group	P1c=0.892 (0.136) P2c=0.232 (1.196)						P1e= 4.877 (0.000)* P2e= 4.403 (0.000) *						

X²(p):chi-square test &p for X² FET (P): Fisher Exact Test & P for FET-Test   Z: Wilcox on test
(p1e): significant test before and immediately after intervention for the study group
(p2e): significant test before and one hour after intervention for the study group
(p1c): significant test before and immediately after intervention for the control group
(p2c): significant test before and one hour after intervention for the control group
(P3): significant test before foot reflexology between study and control groups
(P4): significant test immediately after foot reflexology between study and control groups
(P4): significant test one hour after foot reflexology between study and control groups
*: significant at p≤0.05

Figure (2) manifests the mean post-cesarean pain intensity as measured by modified version of Johansson pain O- Meter scale (affective pain description) across three time measures before and after intervention of the control and experimental group using Friedman's test. It was observed that there was a difference of pain intensity among women of the experimental group across three times measures. Where **before the session of intervention** the pain score was 2.60 and it decreased immediately after intervention to 1.59 and remained at this level one hour after intervention. Vis versa, the mean score of pain never decreased and remained at 2.04 before and after foot reflexology.

A highly statistically significant difference was detected among women of the experimental group before & after intervention in relation to their mean intensity of pain, where (P =0.0000), i.e. a significant reduction in post-cesarean pain intensity was observed among experimental group after intervention. But no statistical difference was observed among women of the control group

(X=28.598p=0.000) Experimental group
(x = 0.839, p =0.657) control group

Fig. (2): Mean post-cesarean pain intensity as measured by modified version of Johansson pain O- Meter scale (affective pain description) across three time measures before and after intervention in the control and experimental group using Friedman's test.

Table (7) illustrates the percent distribution of the experimental and the control groups according to their behavioral responses to pain as measured by modified version of chamber price pain rating scale (CPPRS) before and after intervention.

Before intervention (4-6 h post operative), in relation to *Posture,* guarded position was obvious among 48.6% of the experimental group, and 68.6% of the control group. Meanwhile, tense body posture was observed among 51.4%& 31.4% of the experimental & control groups respectively.
Immediately after intervention, 2.9% of the experimental group compared to 20% of the control group had a tense body posture. And relaxed muscle appeared among 2.9% of the experimental group compared to none of the control group.

1hour after intervention, number of those who had tense body posture increased to 5.7% among the experimental group which may indicate the need for reapplication of the foot reflexology intervention. While the same behavioral expression reached 14.3% of women in the control group. Again relaxed muscle appeared among 16.2% of the experimental group compared to none of the control group.

As regards gross motor activity: *before intervention* (*4-6 h post operative)* 65.7% & 54.3% of the control & experimental groups respectively were slightly restless. While, more than one third (34.3%&45.7%) of the control &experimental group respectively were very restless. Only 2.9% of the control group had a quite gross motor activity compared to 0% of the experimental group.

Immediately after intervention, the percentage of women who were very restless decreased to 20% among experimental group while it increased to 37.1% among the control group

One hour after intervention, women who were very restless remain around one fifths 22.9% in the experimental group. On the contrary, a slight decrease was observed among women who were very restless in control group to be 31.4%.

Considering the *facial expression: before intervention (4-6 h post operative)*, 40% & 28,6% of the control & experimental groups respectively had no frowning, while 48.6% of the experimental group had some frowning compared to 34.3 % of the control group. Meanwhile, those who had constant frowning constituted (25.7% & 22.9 %) of the control & experimental groups respectively

Immediately and one hour after intervention, percent of those who were constantly frowning decreased to be 5.7% immediately after intervention & none one hour after intervention, while percent of those who were constantly frowning remained around one fifths (25.7%, 20% & 17.1) before, immediately &one hour after intervention respectively among the control group

Concerning verbalization: before intervention (4-6 h post operative), 74.3% & 82.9% of the experimental &control groups respectively were moaning from pain.

Immediately and one hour after intervention, the number of those who were moans decreased from 74.3% before intervention to 65.7% and 62.9% immediately &1h after intervention respectively among the experimental group. While it increased to be 88.6% and 97.1% immediately &1h after intervention respectively among the control group

Table (7): Percent distribution of the experimental and control groups according to their <u>behavioral responses</u> to pain as measured by modified version of chamber price pain rating scale (CPPRS) before and after intervention.

Behavioral responses	Time of intervention											
	Control group						Experimental group					
	Before routine hospital care		Immediately after routine hospital care		One hour after routine hospital care		Before intervention		Immediately after intervention		One hour after intervention	
	n=35	%	n=35	%	n=35	%	n=35	%	n=35	%	n=35	%
Posture Relaxed muscle	-	-	-	-	-	-	-	-	1	2.9	6	16.12
Guarded position	24	68.6	28	80	30	85.7	17	48.6	33	94.3	27	77.1
Tense body posture	11	31.4	7	20	5	14.3	18	51.4	1	2.9	2	5.7
Gross motor activity quite	-	-	1	2.9	3	8.6	-	-	11	31.4	13	37.1
Slightly restless	23	65.7	21	60	21	60	19	54.3	17	48.6	14	40
Very restless	12	34.3	13	37.1	11	31.4	16	45.7	7	20	8	22.9
Facial expression No frowning	14	40	10	28.6	11	31.4	10	28.6	21	60	20	57.1
Some frowning	12	34.3	18	51.4	18	51.4	17	48.6	12	34.3	15	42.1
Constant frowning	9	25.7	7	20	6	17.1	8	22.9	2	5.7	-	-
Verbalization Making normal	-	-	-	-	-	-	-	-	-	-	7	20
Groans, moans	29	82.9	31	88.6	34	97.1	26	74.3	23	65.7	22	62.9
Cries out or soap	6	17.1	4	11.4	1	2.9	13	37.1	12	34.3	2	5.7

Table (8) shows percent distribution of the experimental and control groups according to the total score of their behavioral responses to pain as measured by modified version of chamber price pain rating scale (CPPRS) before and after intervention

Before intervention (**4-6 hours post operative**); almost two fifth 45.7% and 40%of the experimental and control groups respectively had severe pain. On the other hand, moderate and unbearable pain was found among 31.4% and 22.9% respectively of the experimental group, compared to 45.7% and 14.3% respectively among the control group.

Immediately after intervention, sever and unbearable pain dramatically decreased from 45.7% to 20% and from 22.9% to 2.9% respectively among the experimental group, while severe pain increased from 40% to more than half (51.4%) and unbearable one decreased from 14.3% to 8.6% among the control group. However, moderate pain decreased from 31.4% to 28.6 among the experimental group, the same decrease in the level of pain was noticed among the control group were the percent filled from 45.7% to 40% among the control group. Mild pain which is the less level of pain that higher levels of pain shifted to it by the effect of foot reflexology intervention, increased dramatically from 0% to 48.6% among the experimental group, while it remained the same (0%) among the control group.

1 hour after intervention, severe pain decreased from more than two fifths (45.7%) to one fifth (20%) among the experimental group, while it increased from 40% to 45.7% among the control group. Meanwhile, unbearable pain decreased from 22.9% to 0% among women in the experimental group and decreased with less effect among the control group from 14.3% to 2.9% among the control group. However, moderate pain remained around one third before and one hour after foot reflexology (31.4% & 34.3%) respectively. But this level of pain increased from 45.7% to 51.4% among the control group.

A highly statistically significant difference was observed among women of the experimental &control groups before and after intervention, where (P =<0.000).Moreover, *another highly significant difference* was also detected among women of the experimental group before & after intervention in relation to their intensity of post-cesarean pain as measured by CPPRS, where (P =0.000). In other words, the intervention seems to have a significant effect in reducing the post-cesarean pain intensity among the experimental group compared to the control group.

Table (8): Percent distribution of the experimental and control groups according to their <u>total score of behavioral responses</u> to pain as measured by modified version of chamber price pain rating scale (CPPRS) before and after intervention.

| Intensity of pain	Time of intervention												F/x^2(p) between Experimental &control groups
	control group						Experimental group						
	Before routine hospital care (4-6 hours after operation)		Immediately after routine hospital care		One hour after routine hospital care		Before intervention (4-6 hours after operation)		Immediately after intervention		One hour after intervention		
	No	%	No	%	No	%	No	%	No	%	No	%	Before intervention P3=1.762 (0.417)
No pain (zero)	-	-	-	-	-	-	-	-	-	-	-	-	
Mild pain (from 1 to 2cm)	-	-	-	-	-	-	-	-	17	48.6	16	45.7	Immediately after intervention P4=22.027 (0.000)
Moderate (from 3 to 4cm)	16	45.7	14	40	18	51.4	11	31.4	10	28.6	12	34.3	
Sever (from 5 to 6cm)	14	40	18	51.4	16	45.7	16	45.7	7	20	7	20	One hour after intervention P5=21.045 (0.000)
Unbearable (from 7 to 8cm)	5	14.3	3	8.6	1	2.9	8	22.9	1	2.9	-	-	
Z (P) before /after Within each group	P1c= 0.476 (0.634) P2c= 1.811 (0.070)						P1e= 5. 002 (0.000)* P2e= 4.827 (0.000)*						

X^2(p):chi-square test &p for X^2 FET (P): Fisher Exact Test & P for FET-Test   Z: Wilcox on test
(p1e): significant test before and immediately after intervention for the study group
(p2e): significant test before and one hour after intervention for the study group
(p1c): significant test before and immediately after intervention for the control group
(p2c): significant test before and one hour after intervention for the control group
(P3): significant test before foot reflexology between study and control groups

(P4): significant test immediately after foot reflexology between study and control groups
(P4): significant test one hour after foot reflexology between study and control groups
*: significant at p≤0.05

Figure (4) demonstrates post-cesarean pain intensity as measured by modified version of chamber price pain rating scale (CPPRS) across three time measures before and after intervention of the control and experimental group using Friedman's test. The figure obviously shows that there was a difference of pain intensity measures among women in the experimental group. Where the pain score was 2.89 **before the session of intervention** (4-6h after surgery) and it decreased to 1.57 immediately after intervention, further decrease in pain intensity was observed one hour after intervention to 1.45. *A highly statistically significant difference* was detected among women of the experimental group before & after intervention, where (P =0.0000). Pain intensity score immediately and one hour after foot reflexology were significantly lower than those before it, vise versa among women of the control group.
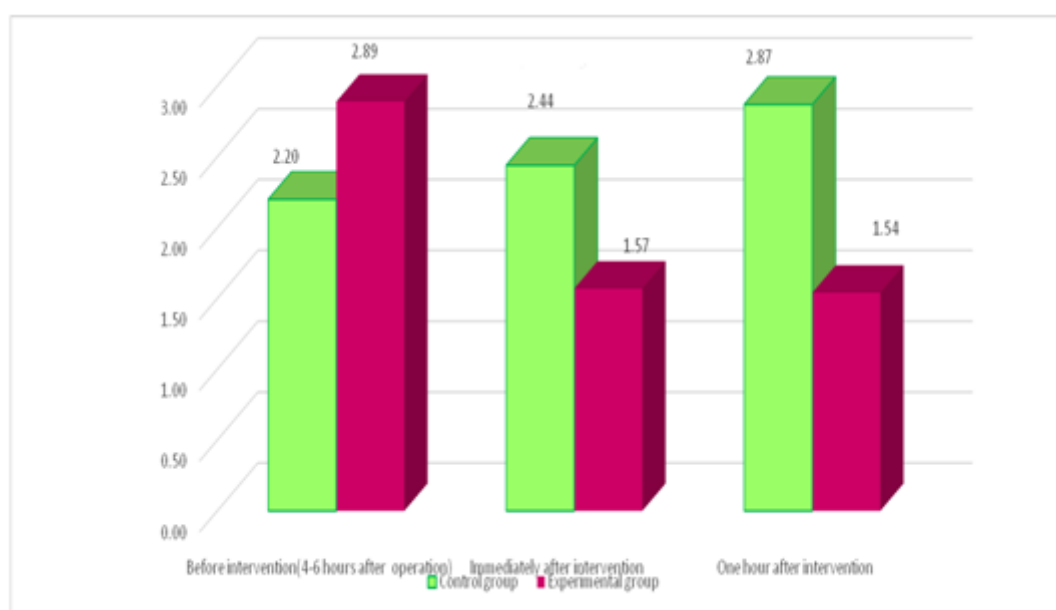
(X=51.964,   p=0.000)* Experimental group
(x = 2.227, p =0.654) control group
Fig. (3): Mean post-cesarean pain intensity as measured by chamber price pain rating scale across three time measures before and after intervention in the control and the experimental group using Friedman's test.

V. Discussion

A according to the results of the current study it can be noticed that both the experimental and control groups were matching in almost all of their socio-demographic characteristics, reproductive and present history (Tables 1- 2& 3-4). This can be interpreted in the light that most women attending El-Shatby Maternity University Hospital are more or less from the same socioeconomic class.

Generally speaking, this consistent profile of the participants was useful in limiting extraneous factors, which could interfere with the effect of the intended intervention on post-cesarean pain. It also helped in understanding and securing the reliability and relevance of the forthcoming results of the current study.

The results of the current study apparently reveal a statistically significant difference between the experimental and control group in relation to post cesarean pain intensity before and after reflexology, to the favor of the intervention. Where, the score of pain sharply declined among the experimental group unlike the control group. This result is congruent with the literature which, indicates that feet are areas of body copious with mechano-receptors or afferent that reacts to minimal physical pressure, resultant pain suppression. The feet are supplied with numerous nerve inputs reaching to ten thousands in each foot. So, they are unique exterior points of the body; considered as natural focus for healing. [13, 15]

In the present study, the effect of reflexology on post-cesarean pain intensity was assessed by the researcher using two tools namely; JPOMS & CPPRS. As expected, no significant difference was encountered before intervention in relation to post-cesarean pain intensity among the experimental & control groups. However, a highly significant difference was obviously monitored between the two groups in relation to pain

intensity immediately and 1 hour after intervention. This was clearly demonstrated when post-cesarean pain intensity among the experimental group changed significantly. Severe & unbearable pain had sharply declined. Also, there was a statistically meaningful difference between pain intensity scores before and right after intervention and pain intensity scores before and 60 minutes after reflexology. Decreased pain intensity among the experimental group may be largely due to their increased comfort and wellbeing, which are probably endorsed by to the applied intervention.

These results are supported by the findings of the study conducted by Mehrnoosh et al (2015), which indicated that significant reduction was observed in the intensity of pain among experimental group. Foot reflexology emerges to be a beneficial non-pharmacological measure of post-cesarean pain relieve. [16] Also the present finding is in line with the study of **Deepshikha** (2016), revealed that the pain intensity score obtained 60 min after foot reflexology was significantly lower in the study group than the control group. So, it was concluded that post-operative foot reflexology can reduce pain in mothers post-caesarean birth. [17]

The current finding also matches with the study of Irani et al (2015) on " **The effect of Reflexology on**

Post-Cesarean Pain and Anxiety " Which compared the mean scores of pain and anxiety before and after the intervention using Mann-Whitney test. The study demonstrated that the mean score of pain and anxiety in the two groups were not significantly different before the intervention, while after the intervention the mean score of pain showed a significant difference and decreased among intervention group immediately, 60 and 90 minutes after the intervention.

[18]. Furthermore, the present finding agrees with the study of Jipi (2014) [19], who noticed a statistically meaningful distinction between pain intensity scores before and after foot reflexology which means that the researchers' hypothesis was conventional; mothers who receive foot reflexology show decreased post-cesarean pain intensity than who do not receive the intervention.

In the same context pain is a common concern post-operative and predominantly after cesarean section. It is a real distress for many women. Therefore, Pain management after cesarean section is necessary for human and medical reasons as proved by relevant researches. The current study, as well as many others, indicates that effective post-operative pain control can be achieved through foot reflexology. This is in line with *Bhagya* (2017), where researcher found that foot reflexology is an efficient non-pharmacological nursing intervention used for pain management in post-operative patients [20]. As well, the current finding is relatively similar to the Literature Review done by Chanif (2013) who revealed that foot reflexology relieves acute postoperative pain [21].

Assessing pain in relation to childbirth is one of the most important midwives' tasks. However, pain research shows that health care professionals often assess women's pain inaccurately [22]. The results of the current study depended upon the evaluation of post-cesarean pain intensity using and affective and sensory pain verbal word descriptors (JB0M) as previously discussed. In accordance with that, a patient's verbal report is considered to be the single most reliable indicator of how much pain the patient is experiencing. Martensson & Bergh (2011) [23] concluded that verbal reports are reliable indicators of treatment effect of pain.

In this respect, the results of the current study revealed that the sensory pain responses reflected a highly significant reduction of post cesarean pain intensity after foot reflexology when assessed using JPOM . Whereas, a considerable proportion of the study sample who described their pain as tearing before massage decreased dramatically to a very small proportion after intervention. Also, none of those who had cutting, burning &pricking, sharp &pricking, cutting & burning pain before reflexology reported the same pain after such application .

Also, when post cesarean pain intensity was assessed among the study group before and after foot reflexology by evaluating their affective responses to such pain, it was rewarding to notice a sharp decrease in terrifying & dreadful, torturing& dreadful sensory responses.

The pain rating index rank as measured by JP0MS (sensory & affective part) in the present study supported the previous results. As foot reflexology seems to be effective in reducing post-cesarean pain intensity after the session of application; a considerable proportion of the study sample who described their pain as severe before intervention decreased dramatically to a very small proportion after application.

The current finding relatively matches with the study of El- Shehata et al (2016) on" Effect of foot pressure points on pain level among patients after abdominal surgery " in Menoufia, Egypt, which revealed that there was a statistically significant decrease of subjective pain score among the study group rather than the control group after interference.[24]

The present finding also relatively agrees with the study of kaur et al (2013); revealed decreased pain scores based on numerical pain scale and observational checklist for behavioral response to pain. Thus it disguised that foot reflexology is effective in the diminution of post operative pain. [25] Adding up, the present finding is congruent with the study carried out by sadizaker (2011) who indicated significant differentiation in pain intensity between the control and the intervention group. [26]

According to the literature review, the behavioral response reflects the degree of pain intensity that the patient experiences, while absence of pain behaviors doesn't mean that the patient is not experiencing pain. In addition, pain behavior is affected by believes and cultures. So the current study assessed the intensity of post-cesarean pain before and after foot reflexology application using chamber price pain rating scale (CPPRS) which was used to determine the intensity of post-cesarean pain by measuring its manifestations. Again, the results of the current study revealed that immediately and one hour after application, an outstanding decline in the intensity of post-cesarean pain was monitored as measured by CPPRS. This was obviously demonstrated among the experimental group before and after application. Whereas, a considerable proportion of the study sample that were in tense body posture, very restless, constantly frowning and who were crying before foot reflexology, decreased dramatically to a very small proportion after intervention.

The current finding is relatively similar to the study of Youssef et al, (2017), who showed that the mean score of pain intensity sharply decline in the intervention group after twenty minutes of applying reflexology weighed against the control group who received routine care only. [27] Moreover, the present finding is supported by Hartha (2012), in her study as it was reported that a significant reduction in pain was obvious after foot kneading [28]. Similar finding was also reported by other studies; Abdel-Aziz (2014) found positive effect of foot manipulate on pain intensity in the experimental group [29]. Furthermore, The current finding relatively corresponds with the study of kale (2013); the study revealed that there is a highly significant difference in the level of post operative pain after giving foot kneading in the experimental group. [30]

On the other hand incongruent of this study results; Maryam (2016) when comparing the results before and after foot reflexology on chronic back pain among nurses; no difference was found in the emotional aspect [31]. What's more, another research by Jong (2012) in Holland didn't support current study results. Where Jong aimed to determine the **effects of 'M' technique manipulation on postoperative infants' levels of pain and distress, after major craniofacial surgery**. It was found that the results of the study do not support a benefit of 'M' technique [32].

It seems to be that the rational for these contradicting results of the above mentioned study against the current paper probably because of different research methodology, sample size, setting, type of surgery, statistical analysis and other research wise parameters. Also, the results of the current study suggest that twenty minute of foot reflexology is effectual. It is postulated that the duration of the intervention is considerably distinctive in pain reduction.

In General, post-cesarean pain was measured in the current study by different means; affective and sensory responses by (JP0M) and assessing the behavioral manifestation by (CPPRS). These tools were used to assess the intensity of post-cesarean pain before and after reflexology procedure applications among the experimental and control groups in different dimensions. In this respect, it is usually established that using multiple tools is much useful in maintaining more reliable results. Accordingly, the results of the current study imply that reflexology can be safely recommended as a mean which has positive effects in reducing post-cesarean pain.

In conclusion, the current study suggests that reflexology as a non-pharmacological, noninvasive and riskless adjuvant pain relief modality seems to be efficient in relieving pain and its application after cesarean birth seems justified. It should be available, whenever applicable to women, as one of the options for analgesia after cesarean section.

VI. Conclusion
Based on the findings of the present study, it can be concluded that:
1. Reflexology after cesarean section appears to have a remarkable effect on post-cesarean pain quality as measured by JP0MS i.e. affective and sensory pain responses (as reflected by Pain – rating Index rank) were significantly lowered after intervention.
2. **Reflexology after cesarean section was likely to have an outstanding decline in intensity of post-cesarean pain as measured by CPPRS. i.e. behavioral manifestation or responses to post-cesarean pain significantly decreased among women after application. Therefore, reflexology can be a cost effective independent nursing intervention and a new useful safe method that can be used to decrease post-cesarean pain which in turn will improve the quality of women's post-cesarean experience. Thus, it can be encouraged as a beneficial non-medical approach in obstetric practice.**

Recommendations
Based on the findings of the present study, the following recommendations are suggested:
1. Reflexology should be advocated as a non-pharmacological approach for management of post-cesarean pain
2. Reflexology should be recommended in hospital protocols for management of post-cesarean pain.
3. Training should be disseminated for obstetric nurses and midwifes to utilize the reflexology for obstetric indications, since it is non-invasive, efficient and easy to use.

Further researches are recommended where replication of the current study on a larger population size and different settings for the purpose of better generalization. And assessment of women's satisfaction with the use of non-pharmacological techniques for management of post-cesarean pain, especially reflexology

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