Effect of Therapeutic Ultrasound and Postnatal Kegel Exercise on the Episiotomy Pain and Wound Healing Among Primiparous Women

Amel Mahmoud Attalla Hessien[1], Magda Sayed Moursy[2], Adel Farouk Al-Bejawy[3], Afaf Mohamed Mahmoud Botla[4]

1. Physiotherapist at Al-Khanka Hospital, Cairo, Egypt
2. Professor of Physical Therapy, for Woman's Health, Faculty of Physical Therapy, Cairo University
3. Professor of Obstetrics and Gynecology, Faculty of Medicine, Cairo University
4. Associated Professor of Physical Therapy for Woman's Health, Faculty of Physical Therapy, Cairo University

ABSTRACT

Background: Episiotomy is performed as one of the most common procedures that facilitate delivery and prevent complications. Pain and discomfort related to episiotomy interfere with women's daily activities after delivery. Kegel exercises helps to keep blood flowing to the perineal areas, as well as helps to tone and firms the muscles in the vagina. Also, ultrasound can reduce swelling and inflammation, improve tissue extensibility and break down adhesions**. Aim of the study**: To investigate the effect of therapeutic ultrasound and postnatal Kegel exercise on the episiotomy pain and wound healing among primiparous women. **Methods:** Thirty primiparous women with an episiotomy following vaginal delivery had been randomly divided into two groups equal in number, the study group (group A) and the control group (group B). **Group (A):** Consisted of 15 primiparous women who were treated by pulsed ultrasound waves and Kegal exercises for 40 minutes, 3 times/week for 4 weeks and were asked to follow usual care advice after episiotomy. **Group (B):** This group was consisted of 15 primiparous women, each woman in this group was asked to use the same usual care advice as for group A. Standardized REEDA scale and Numerical pain scale (NPS) were evaluated before and after 10^{th}, 20^{th}, 30^{th} days after the treatment. **Results:** There was statistically significant difference between groups, (study& control) at 10^{th}; 20^{th} and 30^{th} days after the intervention, regarding to pain intensity and REEDA scale, ($P \leq 0.5$) favoring group A. **Conclusion:** Practicing of postnatal Kegel exercises in addition to ultrasound had a significant effect in decreasing perineal pain after episiotomy and accelerating the healing of the incision.

Key Words: Kegel exercises, Episiotomy, Ultrasound, Wound healing

Introduction

Episiotomy is a simple surgery in which the vaginal orifice is enlarged through making an incision in the perineum. During the second stage of labor, at crowing, these helps for a safe and easy labor and prevent irregular laceration of perineum and fetal complication [1].

For many women, the perineal pain that follow episiotomy is considered the worst aspect of their experience of childbirth. This pain affects greatly on the woman's health. They find difficulties in sitting, walking, sleeping, lactating her new baby and doing her activities of daily living. This pain may extend a few weeks or months after delivery. The result of this pain and discomfort is the disability of the mother [2].

Kegel exercise is the best exercise that can be done after delivery. Kegel exercise helps to keep blood flowing to the perineal area, so inflammation is decreased, and pain is relieved. Also, Kegel exercise which also is known as pelvic floor exercise. This way, it assists in regaining bladder control and preventing occurrence of prolapse.[3]

Other benefits of Kegel exercise include, it is easy to do at home, it makes wound healing faster through increasing blood flow in the perineal region, it is increasing flexibility of the tissues, reduces swelling, relieves pressure on the incision and surrounding tissues and reclines pain as well as tenderness due to wound scarring.[4]

Therapeutic ultrasound is an intervention which is commonly used by physiotherapists to relieve pain and accelerate wound healing process in soft tissue injuries (muscles, ligaments, tendons, joints, capsule and nerves).[5]

Additionally, to this, pulsed ultrasound helps earlier resolution of inflammation, accelerates fibrinolysis, stimulates macrophage derived fibroblast mutagenic factors, heightens fibroblast recruitment, accelerates angiogenesis, and increases tissue tensile strength. All these findings promote and accelerate tissue healing and repair.[6]

So, this study aimed to investigate the effect of pulsed ultrasound augmented by postnatal Kegel exercises on episiotomy pain and wound healing among primiparous women.

It was hypothesized that pulsed ultrasound augmented by postnatal Kegel exercise had no effect on episiotomy pain and wound healing among primiparous women.

Materials and Methods

Participants

Experimental randomized controlled study with repeated measurement was organized. The study was conducted between May 2022 and October 2023. All participants were informed of the procedures, benefits and risks of the study, and they signed informed consent before enrolling in the study. The Ethical Committee of Faculty of Physical Therapy, Cairo university, Egypt, has given their approval (No: REC/012/005377),

All participants were free from any gynecological diseases (uterine prolapse, retroversion flexion of the uterus or chronic pelvic pain), neurological diseases (lumbar disc prolapse, lumber spondylosis or spondylolisthesis), leukemia or tumors (spinal or pelvic tumors), diabetes mellitus, hypertension, heart diseases, cardiovascular diseases and skin diseases. A flow chart of the procedure is given in **Figure 1**.

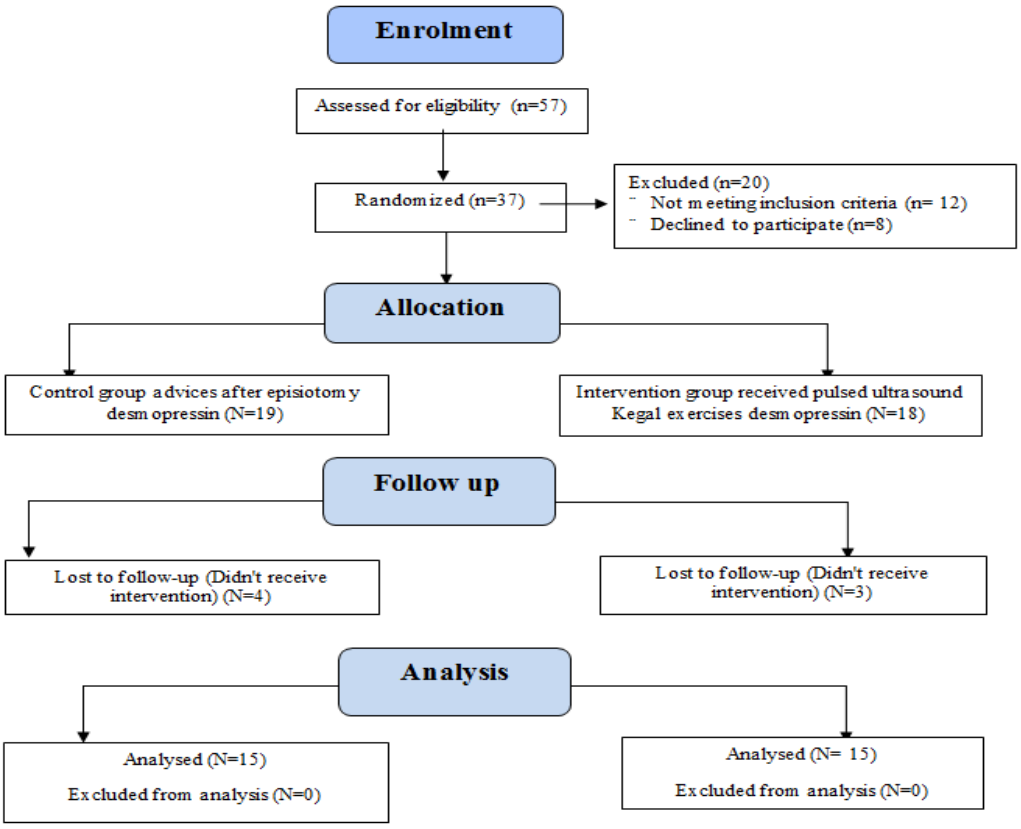

Figure (1): Study Flow Chart

The sample size was estimated by the software, G- power. We selected the two-way MANOVA test and gave an alpha error (0.05) and a statistical power (0.95). The effect size (0.56) was calculated**,** with an expected 10% of attrition [7], 30 subjects are needed. Finally, the sample size calculation was 30 subjects, which were distributed to two groups, with 15 participants in each group.

Thirty patients participated in this study. Their age ranged from 25 to 40 years old, and their BMI was 30 to 35 kg/m2. All women were primiparous with normal vaginal delivery and had episiotomy. All patients in both groups (A&B) were recorded in the treatment course (4 weeks).

A) Procedures:

The patients were randomly assigned into two groups using an allocation number in a sealed envelope and underwent a treatment according to the recruited order and the corresponding random number sealed in an envelope. Patients were assigned into control group and experimental group. All patients were blind to the treatments.

Outcome measures:

1- REEDA Assessment

All data for Redness, Edema, Ecchymosis, Discharge, and Approximation Scale (REEDA) were collected before and after the 10th; 20th; 30th day of the treatment course (4 weeks). For both groups A and B.

Performing REEDA assessment requires a systematic approach:

Gloves, a clean measuring tape, a flashlight, and sterile swabs. Were necessary tools.

Privacy and making the patient felt comfortable.

- Color, extent and intensity of redness around the episiotomy site were observed and documented.
- The degree of edema was assessed by gently palpating the area and comparing it to unaffected tissue was assessed.
- The bruised area was assessed for any changes in color and size.
- The type, odor, and volume of any discharge were evaluated.
- The incision site for signs of approximation or separation was inspected.
- After the assessment was completed the scores of the REEDA were collected. The scores ranged from 0 to 15, a lower score indicates better healing at the episiotomy site and higher score shows poor healing processes. REEDA scale revealed healed; moderately healed: 1 to 5; mildly healed: 6 to 10; and not healed: 11 to 15, the test reliability coefficient of the REEDA scale has been demonstrated to be r=0.70 [8].

2- Pain intensity using numerical pain scale (NPS).

Each woman in both groups (A&B) had been asked to put a mark on the (NPS) to estimate her level of pain. This had been done before and after the 10th; 20th; 30th day of the treatment course (4 weeks), after the assessment the scores of the pain scale were rated (0 No pain, 1-3 Mild pain, 3-5 Moderate pain, 5-7 severe pain , 7-9 very severe pain, 10 worst pain possible) [9].

3- Assessment of the length of the duration required for episiotomy wounds healing.

Each woman in both groups (A&B) had been assessed for the length of the duration required for healing of episiotomy wound.

B) Intervention:

(1) Study group (group A):

Each patient in this group was treated by therapeutic ultrasound and Kegel exercises. As well as follows the general care advice.

1- **Therapeutic ultrasound:** it was applied around stitches of episiotomy for 10 minutes, 3 times / 4 weeks as the following:

(1) The physiotherapist adjusted the ultrasonic device on the following parameters:

- Frequency : 1 MHZ [10].
- Intensity: 0.5-1 W/cm^2
- Mode: Pulsed mode
- Duration: 10 minutes.

(2) Each patient in this group was asked to lie on her bed in crock lying position with slight abduction in her both lower limbs and the perineal area was uncovered, then the area around stitches of the wound was cleaned with a piece of cotton immersed in Dettol perfectly well.

(3) After that, the physiotherapist covered the transducer head (treatment head) of ultrasonic device with a condom to avoid transferring of infection, then she held the transducer head from its handle and put enough Sono gel on the transducer head and the ultrasonic device was switched on.

(4) Later, the physiotherapist started to move the transducer's head around stitches in a circular movement continuously for 10 minutes. After that, the ultrasonic device was switched off and the condom was taken off from the transducer head.

2- Kegal exercise:

- The patients were asked to make sure that the bladder was empty then asked to lie down in supine lying with crossed ankles.
- After that each mother in this group was asked to perform Kegel exercises as a home program, for 40 minutes 3 times/ 4 weeks [11]

The pelvic floor exercise (the home program) was done as following:

Strengthening exercises for pelvic floor muscles:

Steps of exercises:

First step for (Pubo vaginalis muscles):

Position of the mother: Supine lying position with crossed ankles and one layer of clothes on lower abdomen to allow clear observation for lowering of abdomen.

Position of therapist: Stride standing beside the mother asking her to contract as if she controls the urethral orifice action, hold for five second then relax five second. This step was repeated 10 times (50 contraction each day as a home program) **[12]**.

Second step for (Pubo rectalis muscles):

Position of the mother: The mother was asking to lie in supine lying position with crossed ankles.

Position of therapist: The therapist was standing beside the mother and both hands of the therapist under the glutei of the patient around the anus, then the therapist asked the mother to contract as if she controls the bowel action, concentrate in this action, hold for five second and then relax for five second this step was repeated 10 times (50 contraction each day as a home program). This exercise was repeated 3 times /weak, and any contraction in the glutei was avoided during this exercise.

Third step for (The whole muscle):

Position of the mother: The mother was asking to lie in supine lying position with crossed ankles and there was only one stretched layer of clothes on the lower abdomen of the mother.

Position of therapist: The therapist was stride standing beside the mother at the level of her pelvis, her both hands under glutei with the tips of fingers around the anus. While the therapist's eyes were concentrated on the lower abdomen of the mother to observe the contraction of pubovaginalis muscle. The therapist asked the mother to contract as if she controls the bowel action, the urethral orifice action and draw her vagina up, concentrate in this action, hold for five second and then relax for five second this step was repeated 10 times (50 contraction each day as a home program). [12]

Advice

Each woman in this group had been asked to follow the general care advice after episiotomy (warm sitz baths 24 hours after birth, change postpartum pads every 2-4 hours, always wipe front to back after using the bathroom, clean the area, not bearing when defecating, ice packs to decrease the swelling and keep the area around the stitches clean and dry) [13].

(2) Control group (group B):

Each woman in this group had been asked to follow the same general cate advice as in the study group.

Statistical analysis:

The statistical analysis was conducted by using statistical SPSS Package program version 25 for Windows (SPSS, Inc., Chicago, IL). The following statistical procedures were conducted, Quantitative descriptive statistics data: including the mean and standard deviation for age, BMI, length of episiotomy wounds inflammation and proliferation phase, REEDA score, and pain intensity using numerical pain scale variables. Qualitative descriptive statistics data:

including the frequency and percentage for education level variable. Independent-t test: used to compare between study group and control group for age, BMI, and length of episiotomy variables. Chi-square test: used to compare between study group and control group for education level variable. Friedman test: used to compare among 4 assessment points (baseline, 10th day, 20th day, and 30th day) within study group and control group for REEDA score and numerical pain scale variables. Wilcoxon signed ranks test: used to compare between (baseline vs. 10th day), (baseline vs. 20th day), and (baseline vs. 30th day) within study group and control group for REEDA score and numerical pain scale variables. Mann-Whitney U test: used to compare between study group and control group at baseline, 10th day, 20th day, and 30th day for REEDA score and numerical pain scale variables. All statistical analyses were significant at 0.05 level of probability ($P \leq 0.05$).

RESULTS

1. General characteristics of subjects

In this study, thirty primiparous women who had an episiotomy after normal delivery were assigned randomly into two groups (15 patients/group). The mean values of age (year) in study group and control group were 29.93 ±4.55 and 30.07 ± 4.35 years, respectively (Table 1). The mean values of BMI (kg/m^2) in study group and control group were 30.73 ±1.83 and 30.87 ± 1.18kg/m^2, respectively. The statistical analysis revealed that there are no significant differences (P>0.05) in mean values of age (P=0.935), BMI (P=0.815), between study group and control group.

Table (1): Comparison of general characteristics between both groups

Items	Age (Year)	BMI (kg/m^2)
Study group (n=15)	29.93 ±4.55	30.73 ±1.83
Control group (n=15)	30.07 ±4.35	30.87 ±1.18
T-value	0.082	0.237
P-value	0.935	0.815
Significance	NS	NS

Data are expressed as mean ±standard deviation P-value: probability value NS: non-significant (P>0.05)

The education level distribution (Table 2) revealed the frequency (percentage) of can read and write, primary, secondary, and high in study group were 2 (13.3%), 3 (20.0%), 3 (20.0%), and 7 (46.7%), respectively, in control group were 3 (20.0%), 2 (13.3%), 3 (20.0%), and 7 (46.7%), respectively. The statistical analysis revealed that no significant difference (P>0.05) in level of education distribution (P=0.940) between study group and control group.

Table (2): Distribution of education level between both groups

Items	Education level			
	Can read and write	**Primary**	**Secondary**	**High**
Study group (n=15)	2 (13.3%)	3 (20.0%)	3 (20.0%)	7 (46.7%)
Control group (n=15)	3 (20.0%)	2 (13.3%)	3 (20.0%)	7 (46.7%)
Chi-square value	0.400			
P-value	0.940			
Significance	NS			

Data are expressed as frequency (percentage) P-value: probability value (P>0.05) NS: non-significant

2. REEDA score

2.1. Results of REEDA score comparison among 4 assessment points within each group

The statistical analysis revealed that there was significantly (P<0.05) decrease in REEDA score (P=0.0001) at 10th day, 20th day, and 30th day compared to baseline within study group as well as within control group (Table 4).

2.2. Results of REEDA score comparison between baseline and at 10th day within each group

Multiple pairwise comparison tests revealed that there was a significant decrease in REEDA score on the 10th day compared to baseline with change and improvement percentage 1.53 and 33.26% & 0.86 and 18.18%, for study and control group respectively (Table 5).

2.3. Results of REEDA score comparison between baseline and at 20th day within each group

Multiple pairwise comparison tests revealed that there was a significant decrease in REEDA score at 20th day compared to baseline with change and improvement percentage 2.80 and 60.87% & 1.93 and 40.80% in study and control group respectively (Table 6).

2.4. Results of REEDA score comparison between baseline and at 30th day within each group

Multiple pairwise comparison tests revealed that there was a significant decrease in REEDA score at 30th day compared to baseline with change and improvement percentage 4.07 and 88.48% & 3.66 and 77.36% in study and control group respectively (Table 7).

Table (4): Comparison of REEDA score within each group (Time effect)

REEDA score (Mean ±SD)		
Comparisons of 4 assessment points within each group		
Items	Study group (n=15)	Control group (n=15)
Baseline	4.60 ±1.35	4.73 ±1.33
At 10th day	3.07 ±0.88	3.87 ±1.24
At 20th day	1.80 ±0.76	2.80 ±1.01
At 30th day	0.53 ±0.16	1.07 ±0.47
Chi-square value	45.000	44.143
P-value	0.0001*	0.0001*
Significance	S	S

Table (5): Comparison between baseline and on 10th day within each group

Comparison between baseline and on 10th day within each group		
Time effect	Study group (n=15)	Control group (n=15)
Baseline	4.60 ±1.35	4.73 ±1.33
At 10th day	3.07 ±0.88	3.87 ±1.24
Change (MD)	1.53	0.86
Improvement %	33.26%	18.18%
Z-value	3.493	3.606
P-value	0.0001*	0.0001*
Significance	S	S

Table (6): Comparison between baseline and on 20th day within each group

Comparison between baseline and on 20th day within each group		
Time effect	Study group (n=15)	Control group (n=15)

Baseline	4.60 ±1.35	4.73 ±1.33
At 20th day	1.80 ±0.76	2.80 ±1.01
Change (MD)	2.80	1.93
Improvement %	60.87%	40.80%
Z-value	3.462	3.531
P-value	0. 0001*	0.0001*
Significance	S	S

Table (7): Comparison between baseline and on 30th day within each group

Comparison between baseline and on 30th day within each group		
Time effect	Study group (n=15)	Control group (n=15)
Baseline	4.60 ±1.35	4.73 ±1.33
At 30th day	0.53 ±0.16	1.07 ±0.47
Change (MD)	4.07	3.66
Improvement %	88.48%	77.36%
Z-value	3.453	3.449
P-value	0.001*	0.001*
Significance	S	S

2.5. Results of REEDA score comparison between both groups

Considering the effect of the tested group on REEDA score (Table 8), the pairwise comparisons test revealed that **at baseline**, there was no significant difference in the mean ±SD values of REEDA score (P=0.777) between study group and control group.

On the 10th day, there was no significant difference in the mean ±SD values of REEDA score (P=0.075) on the 10th day (Table 8) between study and control group.

On the 20th day, there was a significant difference in the mean ±SD values of REEDA score (P=0.008) on the 20th day (Table 8) between study and control group.

On the 30th day, there was a significant difference in the mean ±SD values of REEDA score (P=0.034) on 30th day (Table 8) between study and control group. This significant decrease in REEDA score at 10th, 20th and 30th day is favorable in primiparous women in study group than primiparous women in control group.

Table (8): Comparison of REEDA score between both groups (Group effect)

REEDA score (Mean ±SD)				
Comparisons between study group and control group				
Items	Baseline	At 10th day	At 20th day	At 30th day
Study group (n=15)	4.60 ±1.35	3.07 ±0.88	1.80 ±0.76	0.53 ±0.16
Control group (n=15)	4.73 ±1.33	3.87 ±1.24	2.80 ±1.01	1.07 ±0.47
MD	0.13	0.80	1.00	0.54

Z-value	0.283	1.783	2.649	2.120
P-value	0.777	0.075	0.008*	0.034*
Significance	NS	NS	S	S

3. Numerical pain scale

3.1. Results of NPS comparison among 4 assessment points within each group

The statistical analysis revealed that there was a significant decrease in NPS (P=0.0001) on 10th day, 20th day, and 30th day compared to baseline within study group (Table 9).
Also, the statistical analysis revealed that there was significant decrease in NPS (P=0.0001) on 10th day, 20th day, and 30th day compared to baseline within control group (Table 9).

3.2. Results of NPS comparison between baseline and at 10th day within each group

Multiple pairwise comparison tests revealed that there was a significant decrease in NPS (P=0.0001) on the 10th day compared to baseline with change and improvement percentage 37.84% and 3.624, & 1.60 and 28.22%, in study and control group respectively (Table 10).

3.3. Results of numerical pain scale comparison between baseline and at 20th day within each group

Multiple pairwise comparison tests revealed that there was a significant decrease in NPS (P=0.0001) on the 20th day compared to baseline with change and improvement percentage 3.54 and 64.72%, & 3.00 and 52.91% in study and control group respectively (Table 11).

3.4. Results of numerical pain scale comparison between baseline and at 30th day within each group

Multiple pairwise comparison tests revealed that there was significant decrease in NPS (P=0.0001) on the 30th day compared to baseline with change and improvement percentage 4.94 and 90.31% & 4.54 and 80.07% in study and control group respectively (Table 12).

Table (9): Comparison of numerical pain scale within each group (Time effect)

Numerical pain scale (Mean ±SD)		
Comparisons of 4 assessment points within each group		
Items	Study group (n=15)	Control group (n=15)
Baseline	5.47 ±1.12	5.67 ±1.17
At 10th day	3.40 ±0.91	4.07 ±1.03
At 20th day	1.93 ±0.79	2.67 ±0.81
At 30th day	0.53 ±0.06	1.13 ±0.40
Chi-square value	45.000	45.000
P-value	0.0001*	0.0001*
Significance	S	S

Table (10): Comparison between baseline and on the 10th day within each group

Comparison between baseline and on the 10th day within each group		
Time effect	Study group (n=15)	Control group (n=15)
Baseline	5.47 ±1.12	5.67 ±1.17
At 10th day	3.40 ±0.91	4.07 ±1.03
Change (MD)	2.07	1.60
Improvement %	37.84%	28.22%
Z-value	3.624	3.520
P-value	0.0001*	0.0001*
Significance	S	S

Table (11): Comparison between baseline and on the 20th day within each group

Comparison between baseline and on the 20th day within each group		
Time effect	Study group (n=15)	Control group (n=15)
Baseline	5.47 ±1.12	5.67 ±1.17
On the 20th day	1.93 ±0.79	2.67 ±0.81
Change (MD)	3.54	3.00
Improvement %	64.72%	52.91%
Z-value	3.530	3.472
P-value	0.0001*	0.001*
Significance	S	S

Table (12): Comparison between baseline and on the 30th day within each group

Comparison between baseline and on the 30 th day within each group		
Time effect	Study group (n=15)	Control group (n=15)
Baseline	5.47 ±1.12	5.67 ±1.17
On the 30th day	0.53 ±0.06	1.13 ±0.40
Change (MD)	4.94	4.54
Improvement %	90.31%	80.07%
Z-value	3.502	3.477
P-value	0.0001*	0.001*
Significance	S	S

3.5. Results of numerical pain scale comparison between both groups

Considering the effect of the tested group on numerical pain scale (Table 13), the pairwise comparisons test revealed that **at baseline**, no significant difference in the mean ±SD values of NPS (P=0.603) between study and control group.

On the 10th day, no significant difference in the mean ±SD values of NPS (P=0.088) at 10th day (Table 13) between study and control group.

On the 20th day, there was a significant difference in the mean ±SD values of NPS (P=0.025) at 20th day (Table 13) between study and control group.

On the 30th day, there was a significant difference in the mean ±SD values of NPS (P=0.017) at 30th day (Table 13) between study and control group.

This significant decrease in NPS on the 20th and 30th day is favorable in primiparous women in study group than primiparous women in control group

Table (13): Comparison of numerical pain scale between both groups (Group effect)

Numerical pain scale (Mean ±SD)				
Comparisons between study group and control group				
Items	Baseline	At 10th day	At 20th day	At 30th day
Study group (n=15)	5.47 ±1.12	3.40 ±0.91	1.93 ±0.79	0.53 ±0.06
Control group (n=15)	5.67 ±1.17	4.07 ±1.03	2.67 ±0.81	1.13 ±0.40
MD	0.20	0.67	0.74	0.60
Z-value	0.520	1.708	2.237	2.384
P-value	0.603	0.088	0.025*	0.017*
Significance	NS	NS	S	S

4- Duration required for episiotomy wound healing

Table 14 shows the average duration required for episiotomy wound healing. In the intervention group it was 10.25 days and in the control group was 11.30 days, so it can be concluded that the healing process of episiotomy wound in the group given therapeutic ultrasound and Kegel exercise 1 day faster than in the control group.

Table (14): The duration required for episiotomy wound healing in the intervention and control groups

No	Heal	Total (Person)	Percentage
Intervention Group			
1	10 days	10	75
2	11 days	5	25
3	15 days	0	0
Total		**15**	**100**
Average		**10.25**	
Control Group			
1	10 days	1	5
2	11 days	10	60
3	12 days	4	35
4	15 days	0	0
Total		**15**	**100**
Average		**11.30**	

DISCUSSION

The main aim of the study was to examine the effect of therapeutic ultrasound and postnatal Kegel exercise on the episiotomy pain and wound healing among primiparous women. Findings of the present study supported the mothers who performed Kegel exercises with ultrasound had faster episiotomy wound healing and had less perineal pain better than those on control group who followed the usual care advice after episiotomy only.

Kegel exercises also known as pelvic floor exercises is the first exercise that a woman should do immediately after delivery to strengthen pelvic floor muscles which in turn support rectum and small intestine. Kegel exercise can be done within 24 hours after delivery to speed up the healing process after episiotomy; also, it helps in bladder control and improves the muscle tone of the vagina.[14]

***Eid et al.*, [15]** reported that "Kegel exercises in postnatal period have a positive effect and remarkable evidence on both relieving episiotomy pain and acceleration wound healing".

Kegel exercise is the most common method that promotes and accelerates wound healing after episiotomy. Also, it decreases perineal pain following episiotomy, facilitates restoration of muscle tone, stimulates circulation in the perineal area and decreases pressure on the incision as well as the surrounding tissues**.** [16]

The previous result agreed with **Beckmann & Stock** [17]**,** who studied the effect of Kegel exercises on episiotomy healing in postnatal women. The study revealed that Kegal exercises accelerated the healing of wound within the first 24 hours after the intervention.

In addition, there was a highly statistically significant difference between both groups (study & control) regarding REEDA score. The postnatal women who adopted Kegel exercises showed accelerated healing of episiotomy incision, by other meaning had lower wound healing score than those who did not adopt Kegal exercises. This may be due to the effect of Kegel exercises in increasing the circulation in this area, improving the tone and elasticity of perineum, so the perineal muscle became healthier and stronger which helped in healing of episiotomy wound faster, also the mother in this period had less perineal pain so she can contract the muscles efficiently according to the predetermined time and frequency**.[18]**

This result is in congruence with **Oya & Sevgul** [19], who studied the effects of prenatal perineal massage and Kegel exercises on the integrity of postnatal perineum, the result revealed that the effect of Kegel exercises occurs within 2 weeks after the intervention to help in improving the circulation in the perineum area, helping the perineum heal from an episiotomy or tearing and decreasing the chance of developing hemorrhoids. As well, the study agreed with **Caroline Fleten et al., [20],** who reported that since pelvic floor muscle exercises performed from day after delivery until two weeks later would increase the tone and elasticity of perineum, increase the circulation in this area so healing of episiotomy wound would be faster.

Fitri et al., [21], reported that "Kegel exercise helps to keep blood flowing to the perineal area and helps to tone and firms the pelvic floor muscles. So, performing postnatal Kegel exercises has a significant effect in decreasing perianal pain after episiotomy and accelerating wound healing of the incision.

According to this study, it was found that ultrasound therapy can be considered as one of the alternative methods in treating wound pain as well as pain after episiotomy.

It has been suggested that ultrasound interacts with one or more components of inflammation and lower resolution of inflammation, alteration of collagen fibers type distribution, with a relative increase in type III collagen over type I collagen and in some tendon lesions, fibrovascular proliferation and focal expression of type II collagen. After injury, an increase in matrix turnover is necessary to remove damaged matrix and to remodel scar tissue. Alternatively, ultrasound may be used for its thermal effects to relieve pain and muscle spasm and to increase tissue extensibility [22].

Also, the thermal effect of US is beneficial for chronic inflammation is supported by the work of Low and Reed [23] as they mentioned that heat increases blood flow and thereby increases microvascular hydrostatic pressure that helps in the reabsorption of late inflammatory exudates and debris.

Limitations

Any other cause of delay in wound healing as acute infection and use accurate objective way to measure the wound healing

Conclusion

Practicing postnatal Kegel exercises with ultrasound had been a significant effect on decreasing perineal pain and accelerating healing of the perineal incision after episiotomy.

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