



The Effects of Structured Self-Perineal Care Education on Episiotomy Pain Score and Wound Healing Outcome among Primigravida Mothers in Malaysia Urban Area

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Abstract

Background: Pain and wound dehiscence cause physical and emotional traumas, impacting the mothers' quality of life, mental health, and maternal-child bonding.

Objectives: The present study aimed to examine the effect of self-perineal care (SPC) education on episiotomy pain scores and wound healing outcomes.

Methods: A quasi-experimental design was used in this study. In the third trimester, 125 primigravida mothers attended the antenatal clinic and were assigned to a SPC education group (n=62) and a control group (n=63). The intervention group received two phases of SPC education apart from the study hospital's routine care, and the mothers in the control group received only routine care. The primigravida mothers in the treatment group were provided SPC education content on their smartphones using the "SPCE" mobile application. Mothers in both groups self-reported their episiotomy pain score and wound healing outcome over 7 days post-childbirth using this mobile application.

Results: The overall pain and REEDA scores (redness, oedema, ecchymosis, discharge, approximation) were significantly lower in the intervention group than in the control group for the first 7-days post-delivery with $P < 0.001$ except for 4 h of baseline observation. For each activity of daily living, the scores were lower in the intervention group for the 7 days post-delivery.

Conclusion: Self-perineal care education positively reduced episiotomy pain scores and enhanced wound healing outcomes. This study empowered the primigravida mothers to take responsibility for their health by involving in a self-care education program.

Keywords: Episiotomy pain score, Primigravida mothers, Self-perineal care education, Wound healing

1. Background

Nurses have a significant role in preventing maternal and newborn complications by providing early health education and intervention. Self-perineal care (SPC) education helps primigravida mothers to gain adequate knowledge and maintain a good practice of perineal care after childbirth. However, due to the short stay of post-partum mothers in the postnatal ward due to the high demand for the facilities; consequently, identifying and addressing individual education needs could be difficult for nurses.

According to a retrospective review by Selvadurai, the episiotomy rate in Malaysia was highest among women within the age range of 10-20 years (38.5%), primigravida (45.12%), and among Chinese ethnicity (32.75%) compared to Malay (23.43%) and Indian (28.98%) (1). The episiotomy rate in Malaysia in 2010 was 22.33% which was in line with the recommendation of the World Health Organization (1). Episiotomy wounds are expected to heal within a

short, predictable time without significant consequences. Activities such as walking, sitting, urinating, defecating, and lying down cause intense pain in the perineum muscles (2). The pathogenic organisms easily thrive at the perineum due to moisture and a lack of ventilation. In addition, defecation, micturition, and lochia are good media for bacterial growth (3). Therefore, self-perineal care is crucial to reduce pain and optimize wound healing outcomes. Inadequate education about perineal care can limit the early detection and management of complications related to childbirth, such as puerperal perineal infection, wound breakdown, and other infections associated with the genital tract (4).

A few self-care programs have been developed and offered exclusively to antenatal mothers and suggested that SPC education is a good alternative in an environment with a high patient rate. In addition, the "SPCE" mobile application is a supplement to the education program since it can involve mothers in the educational program and receive feedback more

effectively. Evidence shows that this mobile application is an effective tool for knowledge sharing, interaction, and monitoring outcomes of educational intervention (5). Through access to the information in the mobile application, Primigravida women can become more engaged in their care (6).

2. Objectives

The objective of the present study was to determine the effectiveness of SPC education on pain score and wound healing among primigravida mothers, which was also aided by the "SPCE" mobile application. The novelty of this study was the mobile application used as a module package that included knowledge sharing, interaction, and monitoring besides the structured information on self-perineal care to replace the traditional use of pamphlets. Moreover, the current study was conducted early in the antenatal phase on primigravida mothers.

3. Methods

3.1. Study design

This quasi-experimental study with control and intervention groups was conducted from August 2019 to March 2020. This study followed the Declaration of Helsinki's principles and standard clinical practice guidelines.

3.2. Setting and Participants

This quasi-experimental study was conducted in two hospitals in Klang Valley, Malaysia. There are seven hospitals in Klang Valley with the same characteristics: government hospitals, teaching hospitals, and referral hospitals. The researcher conducted multi-stage sampling methods using the draw lot method to choose two hospitals among these seven hospitals. Later from these two hospitals, the researcher performed simple random sampling using the draw lot method to choose one hospital for the intervention group and the other hospital as a control group. These two hospitals have similar inpatient care management and policies. Both hospitals provide tertiary care services and act as referral centers for other hospitals in Malaysia. The mean birth rate per month in both selected hospitals was 1,200.

The present study was conducted on 130 primigravida mothers (they were in the antenatal phase) selected from the antenatal clinic through a consecutive sampling approach. Inclusion criteria were primigravida mothers at 32 to 33 weeks gestation, who had access to a smartphone, were aged 18 to 45 years old, were able to communicate in English or Malay, and were at low-risk pregnancy. Those with perineal hematoma or abscess, systemic

disorders, obesity, smoking and alcohol consumption habits, and mothers with hospitalized newborns were excluded because these factors could influence the pain score and wound healing outcomes.

The sample size was calculated using G*Power Software (version 3.1) (7). The level of significance and power was set as 0.05 and 80%. The minimum required sample size was 60 per arm. Given a 20% attrition rate (8), a sample size of 65 per arm was decided.

3.3. Educational Intervention

The two sessions with the mothers were held at different times. The SPC education phase 1 (theory session) was conducted for primigravida mothers during antenatal visits at the antenatal clinic at 32 to 33 weeks of gestation. The second phase (hands-on practice) was carried out 4 h following childbirth. Each teaching session was held face-to-face and lasted between 30 to 45 min. The time frame between each session was at least 4 weeks apart between pre-intervention and post-intervention to allow the mother to integrate the theoretical knowledge into practice.

This education consisted of information on regular perineal care, sign and symptoms of infection, Sitz bath, Kegel exercise, diet during post-partum, numerical pain rating scale (NPRS), REEDA (redness, oedema, ecchymosis, discharge, approximation) score as shown in Table 1 (9) and intervention to relieve swelling using the ice pack. The content of SPC education was validated by a panel of six experts from the Obstetrics and Gynaecology Department of the study hospitals. The experts carried out an independent evaluation of the quality of the content. The content validity index (CVI) and scale's CVI were measured at 0.84 and 0.89, respectively. Following the validation, all the information on SPC education was uploaded to the mobile application and later downloaded on mothers' smartphones in the intervention group. Two Computing and Creative Department experts validated the "SPCE" mobile application's usability and functionality. A pilot study was conducted with 30 primigravida mothers to ensure the effectiveness and efficiency of the mobile application. The mobile application was improved on the user registration page, where the mother's handphone number was used as a username rather than an email address, as many mothers do not have an email address. An interview session was also arranged with the primigravida mothers to ask their opinion and satisfaction with the mobile application. The "SPCE" mobile application consisted of checklists for the perineal care practice, an observation chart for pain scores based on NPRS, a wound healing outcome observation chart based on the REEDA score, and information on self-perineal care education.

Table 1. Redness, oedema, ecchymosis, discharge, and approximation of the edges of the lesion assessment scale (REEDA) (9)

| Points | Redness | Oedema | Ecchymosis | Discharge | Approximation |
|-----------------------|--|---|---|------------------|--|
| 0 | None | None | None | None | Close |
| 1 | Within 0.25 cm of the incision bilaterally | Perineal, less than 1 cm from the incision | Within 0.25 cm bilaterally or 0.5 cm unilaterally | Serum | Skin separation 3 mm or less |
| 2 | Within 0.5 cm of the incision bilaterally | Perineal and/or between 1 to 2 cm from the incision | Between 0.25 cm to 1 cm bilaterally or between 0.5 to 2 cm unilaterally | Serosanguinous | Skin and subcutaneous fat separation |
| 3 | Beyond 0.5 cm of the incision bilaterally | Perineal and/or vulvar, greater than 2 cm from the incision | Greater than 1 cm bilaterally or 2 cm unilaterally | Bloody, purulent | Skin, subcutaneous fat, and fascial layer separation |
| Score | | | | | |
| Total Score 15 | | | | | |

3.4. Instruments to measure outcomes

3.4.1. The Numerical Pain Rating Scale (NPRS)

The NPRS was used to assess the overall pain score and pain during daily activities by self-reporting using the mobile application. It is a 0 to 10-point pain intensity scale developed by McCaffery and Beebe (10), with 0 for no pain to 10 for the worst pain imaginable (11). The participants were asked to report an average pain intensity on an 11-point numerical scale. The NPRS was evaluated psychometrically with Cronbach's alpha coefficient of 0.78 and adequate content validity (12).

3.4.2. Standardized REEDA scale

The REEDA scale by Davidson is a tool for assessing perineal healing that uses five criteria to assess the inflammatory process and tissue healing in perineal trauma: redness, edema, ecchymosis, discharge, and wound edge approximation (13).

Each item is rated on a scale of 0 to 3; the total score could range from 0 to 15. The maximum value of 15 indicates the worst perineum healing outcome. A higher score indicates a greater level of tissue trauma as the sign of redness, edema, ecchymosis, discharge, and approximation are observed as moderate to severe in a perineal wound. On this scale, a lower score indicates better wound healing at the episiotomy site, and a higher score indicates poor healing processes. The scale's reliability was $r=0.79$, and adequate content validity (14).

3.5. Data Collection

The aim and methods of the study were explained to the mothers who met the study criteria in both groups. The participants completed the informed consent sheets. The SPC education was given to the mothers in the intervention group, and the mothers in the control group followed routine care at the study hospital. Routine care refers to unstructured self-perineal care advice given to the mothers post-childbirth or upon discharge home.

The theory session of SPC education was held during the antenatal period at 32 to 33 weeks of gestation. During this teaching phase, the study's purpose and methods were explained to the mothers

in both groups at the antenatal clinic. The "SPCE" mobile application was downloaded on their smartphones with the mothers' permission. They were shown how to access the mobile application and its content using their smartphones. The mobile application was used to complete the demographic information. All the primigravida mothers in both groups were followed up till the delivery date.

At 4 h post-delivery, the researchers conducted a baseline observation on pain score and episiotomy wound observation, followed by the second phase of SPC education to the mother to reinforce hands-on practical sessions on perineal care. The mother was taught to remove the soiled pad, wash the perineal, and pat dry the perineum from front to back. The correct technique of fixing a sanitary pad from front to back was shown. The mother was directed to examine the episiotomy wound for redness, edema, ecchymosis, discharge, and approximation of wound edges. To do this, she was told to lie down in a dorsal position and place a hand mirror beneath the perineum so that the wound could be examined easily. Since this observation was done just 4 h post-delivery, the mother was taught to measure the presence of redness and edema. The mother held a disposable paper tape (with centimeters measurement on it) in their dominant hand to measure the surface of any abnormalities such as redness, edema, ecchymosis, and approximation of the wound by looking at the mirror. Following the teaching, the researchers recorded the scoring with the help of the REEDA scale. The mother was guided on measuring the presence of redness and edema, observing the wound according to the REEDA scale, and how to key in data using the mobile application. Mothers in both groups self-reported the pain score and wound healing observation using the "SPCE" mobile application daily in the morning from day 1 to day 7. It would have taken the primigravida mothers 10 to 15 min each day to record the information.

The researcher collaborated with the community nurses from the nearest government maternal child health clinic, who were in charge of the mothers who lived in their area. The community nurses from the maternal-child health clinics performed regular

postnatal home visits to all the mothers under their care in their area. The help of the community nurses was obtained after explaining to them about the study and expected observations to be done by the mothers. On Day 5 of the postnatal period, the researchers contacted the midwife to get her report on the mother's condition to ensure the mother's perineal care practice, pain score, and wound healing outcome aligned with the mother's self-reporting information. The researcher made phone calls to the mother in case of need for any clarification regarding the episiotomy wound.

Consolidated standards of reporting trials (CONSORT) 2010 guideline (Figure 1) explains the interventional study. A total of 186 patients participated in the study. However, 34 participants did not meet the inclusion criteria. Ten participants declined to participate for various reasons, and 12 could not participate due to not owning a smartphone. Therefore, the final total sample size of the study was 130 primigravida mothers. The total sample size of the primigravida mothers in the intervention group was 65 patients, and 65 primigravida mothers were also assigned to the control group.

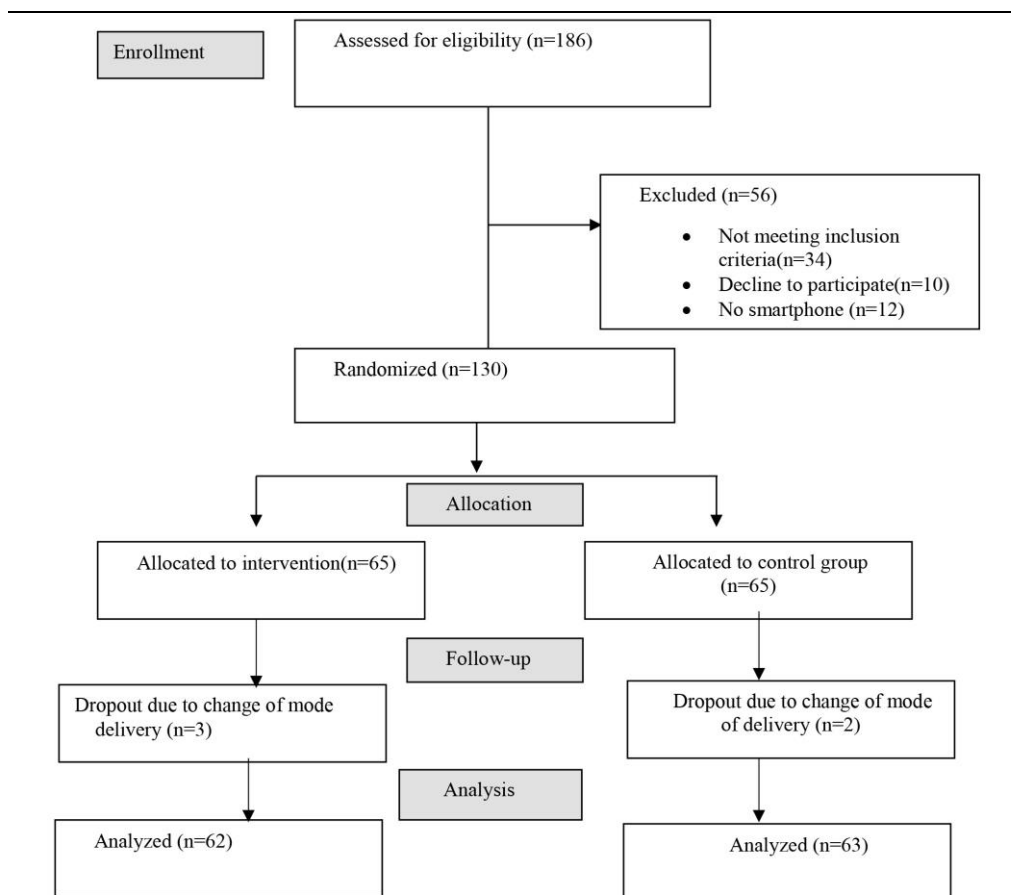


Figure 1. CONSORT flow diagram of the study

Three participants from the intervention group dropped out of the study as they had a Caesarean section due to fetal distress. Two participants from the control group also dropped out due to instrumental delivery and Caesarean section. Finally, the present study consisted of 62 and 63 primigravida mothers in the intervention and control groups, respectively.

3.6. Data Analysis

The collected data were analyzed using IBM Statistical Package for the Social Sciences Software (version 24.0). Means and standard deviations were used to describe quantitative variables, while frequencies and percentages were used to describe

qualitative variables. The differences in pain and wound healing outcomes over the 7 days were tested using the Generalized Estimating Equation (GEE) procedure. For all tests, a P-value less than 0.05 was considered statistically significant.

4. Results

4.1. Socio-demographic data

The socio-demographic characteristics of the participants in the intervention group (n=62) and the control group (n=63) are indicated in Table 2. Overall, the majority of 93(74.4%) participants were Malays. The mean age was 25.52 ± 4.21 years. Among these participants, 68(54.4%) had secondary-level

education, 51(40.8%) were housewives, 69(55.2%) were from nuclear families, and 49(39.2%) of mothers had a household income of RM 3,000 to 4,000. Only 48(38.4%) of the primigravida mothers were aware of self-perineal care, and out of this, 19(39.6%) claimed that their primary source of information was social media. There were no significant differences in all socio-demographic characteristics between the intervention and control groups.

4.2. Effect of self-perineal care education on pain score

The Generalized Estimating Equations (GEE) procedure was used to test the changes in overall pain scores over the 7-days post-delivery. The difference between the group and change over time

was significant in the analysis ($P < 0.001$). The group*time effect was also significant ($P < 0.001$), indicating that the two groups' changes over time were different. The analysis was controlled for the usage of analgesics. The group's changes in overall pain scores over time are shown in Table 3. The intervention group's pain scores were significantly lower than that of the control group ($P < 0.001$) except for assessment at 4 h post-delivery ($P = 0.329$). The same procedure was also used to test pain interference during selected daily activities. The results are displayed in Table 4. In total, the intervention group's pain scores for all five activities declined over time compared to the control group's.

Table 2. Characteristics of the Participants

| Characteristics | All subjects (n=125) n(%) | Intervention (n=62) n(%) | Control (n=63) n(%) | P-value |
|------------------------------|---------------------------------|--------------------------------|---------------------------|--------------------|
| Age | 25.52±4.21 ^a | 25.48±3.51 ^a | 25.56±4.83 ^a | 0.722 ^b |
| Ethnicity | | | | |
| Malay | 93(74.4) | 46(74.2) | 47(74.6) | 0.911 ^c |
| Chinese | 18(14.4) | 10(16.1) | 8(12.7) | |
| Indian | 9(7.2) | 4(6.5) | 5(7.9) | |
| Others | 5(4.0) | 2(3.2) | 3(4.8) | |
| Education | | | | |
| Primary | 19(15.2) | 7(11.3) | 12(19.1) | 0.060 ^c |
| Secondary | 68(54.4) | 37(59.7) | 31(49.2) | |
| Tertiary | 38(30.4) | 18(29.0) | 20(31.7) | |
| Occupation | | | | |
| Government | 10(8.0) | 6(9.7) | 4(6.3) | 0.266 ^c |
| Private | 47(37.6) | 27(43.5) | 20(31.7) | |
| Self Employed | 14(11.2) | 6(9.7) | 8(12.7) | |
| House wife | 51(40.8) | 23(37.1) | 28(44.4) | |
| Student | 3(2.4) | 0 | 3(4.8) | |
| Family Type | | | | |
| Nuclear | 69(55.2) | 30(48.4) | 36(57.1) | 0.424 ^c |
| Extended | 56(44.8) | 32(51.6) | 27(42.9) | |
| Income (R.M.) | | | | |
| 1000 to 2000 | 23(18.4) | 12(19.4) | 11(17.5) | 0.072 ^c |
| 2000 to 3000 | 27(21.6) | 8(12.9) | 19(30.2) | |
| 3000 to 4000 | 49(39.2) | 25(40.3) | 24(38.1) | |
| >4000 | 26(20.8) | 17(27.4) | 9(14.3) | |
| Aware of SPC | | | | |
| Yes | 48(38.4) | 28(45.1) | 20(31.7) | 0.123 ^c |
| No | 77(61.6) | 34(54.8) | 43(68.3) | |
| Source of Information | | | | |
| Family members | 6(12.5) | 3 (4.8) | 3(15.0) | 0.465 ^c |
| Friends | 15(31.3) | 8(12.9) | 7(35.0) | |
| Health care providers | 8(16.7) | 6(9.7) | 2(10.0) | |
| Social media | 19(39.6) | 11(17.7) | 8(40.0) | |

^aMean (S.D.), ^bMann-Whitney U Test, ^cPearson Chi-Square Test, ¶SPC-Self Perineal Care

Table 3. Comparison of overall pain scores within and between groups

| Time | Intervention(n=62) Mean±SE | Control(n=63) Mean±SE | P-value |
|---------|-------------------------------|--------------------------|----------|
| 4 hours | 8.35 ± 0.19 | 8.11 ± 0.16 | 0.329 |
| Day 1 | 5.18 ± 0.21 | 6.41 ± 0.13 | <0.001** |
| Day 2 | 4.65 ± 0.71 | 5.59 ± 0.15 | <0.001** |
| Day 3 | 3.92 ± 0.20 | 4.79 ± 0.17 | <0.001** |
| Day 4 | 3.77 ± 0.19 | 3.98 ± 0.16 | <0.001** |
| Day 5 | 2.87 ± 0.16 | 3.57 ± 0.14 | <0.001** |
| Day 6 | 2.13 ± 0.13 | 3.33 ± 0.15 | <0.001** |
| Day 7 | 1.52 ± 0.160 | 2.92 ± 0.17 | <0.001** |

Generalized Estimating Equation (GEE), **Significant at 0.05 level

Table 4. The overall mean pain score differences during daily activities between groups

| Daily activities | Intervention Group (n=62) | Control group (n=63) | P-value |
|-------------------|---------------------------|----------------------|-----------|
| | Mean±SE | Mean±SE | |
| Walking | | | |
| 4 hours | 7.13 ± 0.21 | 6.79 ± 0.28 | 0.239 |
| Day 1 | 5.39 ± 0.21 | 5.84 ± 0.23 | 0.064 |
| Day 2 | 2.71 ± 0.16 | 4.98 ± 0.23 | <0.001** |
| Day 3 | 2.51 ± 0.15 | 4.39 ± 0.23 | <0.001** |
| Day 4 | 2.39 ± 0.15 | 4.06 ± 0.23 | <0.001** |
| Day 5 | 2.18 ± 0.16 | 3.78 ± 0.20 | <0.001** |
| Day 6 | 1.85 ± 0.18 | 3.54 ± 0.19 | <0.001** |
| Day 7 | 1.55 ± 0.20 | 3.39 ± 0.22 | <0.001** |
| Sitting | | | |
| 4 hours | 7.74 ± 0.32 | 8.41 ± 0.24 | 0.110 |
| Day 1 | 6.69 ± 0.65 | 6.70 ± 0.25 | 0.599 |
| Day 2 | 5.82 ± 0.24 | 5.88 ± 0.26 | 0.070 |
| Day 3 | 4.82 ± 0.26 | 4.90 ± 0.26 | 0.766 |
| Day 4 | 3.95 ± 0.23 | 4.22 ± 0.24 | 0.218 |
| Day 5 | 3.43 ± 0.23 | 4.05 ± 0.24 | 0.004** |
| Day 6 | 2.47 ± 0.21 | 3.68 ± 0.23 | <0.001** |
| Day 7 | 1.59 ± 0.21 | 3.16 ± 0.24 | <0.001** |
| Urination | | | |
| 4 hours | 6.91 ± 0.20 | 7.05 ± 0.25 | 0.101 |
| Day 1 | 5.37 ± 0.29 | 6.90 ± 0.26 | <0.001** |
| Day 2 | 4.15 ± 0.18 | 6.09 ± 0.15 | <0.001** |
| Day 3 | 3.86 ± 0.18 | 5.36 ± 0.19 | <0.001** |
| Day 4 | 3.18 ± 0.15 | 4.59 ± 0.16 | <0.001** |
| Day 5 | 2.71 ± 0.13 | 3.96 ± 0.15 | <0.001** |
| Day 6 | 2.00 ± 0.13 | 3.45 ± 0.15 | <0.001** |
| Day 7 | 1.28 ± 0.14 | 3.00 ± 0.17 | <0.001** |
| Defecation | | | |
| Day 1 | 7.71± 0.32 | 7.87 ± 0.30 | 0.801 |
| Day 2 | 5.39± 0.31 | 5.34 ± 0.26 | 0.887 |
| Day 3 | 4.74± 0.29 | 6.54 ± 0.26 | < 0.001** |
| Day 4 | 4.03± 0.28 | 6.13 ± 0.26 | < 0.001** |
| Day 5 | 3.53± 0.20 | 5.13 ± 0.27 | <0.001** |
| Day 6 | 2.75± 0.24 | 4.23 ± 0.26 | <0.001** |
| Day 7 | 2.10± 0.19 | 2.99 ± 0.22 | <0.001** |
| Lying | | | |
| 4 hours | 6.99 ± 0.20 | 7.60 ± 0.20 | 0.061 |
| Day 1 | 5.59 ± 0.22 | 6.29 ± 0.18 | <0.001** |
| Day 2 | 4.59 ± 0.21 | 6.64 ± 0.88 | <0.001** |
| Day 3 | 3.95 ± 0.18 | 5.01 ± 0.18 | <0.001** |
| Day 4 | 3.14 ± 0.16 | 4.34 ± 0.17 | <0.001** |
| Day 5 | 2.59 ± 0.16 | 3.33 ± 0.18 | <0.001** |
| Day 6 | 1.82 ± 0.15 | 2.98 ± 0.19 | <0.001** |
| Day 7 | 1.30 ± 0.16 | 2.47 ± 0.21 | <0.001** |

Generalised Estimating Equations (GEE)

**Significant at the p < 0.05 (2 tailed)

4.2.1. Effect of self-perineal care education on wound healing outcome

The GEE procedure was also used to test the changes in wound healing scores over the 7-day post-childbirth. The difference between groups and change over time was significant in the analysis ($P < 0.001$). The group*time effect was also significant ($P < 0.001$). As some mothers had used traditional remedies, the analysis was controlled for using traditional methods.

The changes in REEDA scores and the difference in the changes over time in the two groups are

shown in [Table 5](#). Overall, the mean total REEDA score decreased over time in both groups. There was a significant reduction within the group at each subsequent time point. Except for assessment at 4 h after delivery ($P = 0.251$), in between-group comparisons, the mean total REEDA score was significantly lower in the intervention group than in the control group with ($P = 0.33$) on day 1, from day 2 to day 7 post-delivery ($P < 0.001$). At 4 h, the REEDA scale for redness, edema, and ecchymosis criteria was higher than at any other time as episiotomy had just been repaired.

Table 5. Comparison of mean total REEDA score between groups

| Time | Intervention(n=62) | Control(n=63) | P-value |
|---------|--------------------|---------------|----------|
| | Mean±SE | Mean±SE | |
| 4 hours | 5.36±0.021 | 5.73±0.29 | 0.251 |
| Day 1 | 4.12±0.26 | 5.02±0.43 | 0.033 |
| Day 2 | 2.80±0.24 | 4.20±0.44 | <0.001** |
| Day 3 | 1.62±0.40 | 3.71±0.49 | <0.001** |
| Day 4 | 1.34±0.40 | 3.06±0.47 | <0.001** |
| Day 5 | 1.22±0.39 | 3.01±0.42 | <0.001** |
| Day 6 | 1.15±0.35 | 2.69±0.51 | <0.001** |
| Day 7 | 1.01±0.39 | 2.50±0.43 | <0.001** |

Generalised Estimating Equations (GEE) **Significant at the $p < 0.05$ (2 tailed)
REEDA (redness, oedema, ecchymosis, discharge, approximation)

5. Discussion

The present study showed significant findings in the primary outcome. This study found that the mothers in the intervention and control groups showed a reduction in mean total pain scores and mean total REEDA scores over time. The mean total pain score in the intervention group was lower than the control group. This finding was similar to the previous quasi-experimental study done in Egypt, which revealed a statistically significant difference between both groups after 48 h post-partum regarding perineal redness and perineal oedema (15).

In the current study, SPC education used an ice pack to relieve edema, Kegel exercise, and a Sitz bath to reduce pain and promote wound healing. Many studies concluded that the ice pack application at the episiotomy site plays an important role and significantly decreases post-episiotomy pain in the experimental group than in the control groups (16-18). Postnatal Kegel exercises significantly decreased perineal pain after an episiotomy and accelerated incision healing (19). Practicing a Sitz bath can promote blood flow to the episiotomy wound for rapid healing and reduce pain score (20, 21).

Another study in Egypt recommended introducing self-perineal pain care to antenatal mothers (18). The finding of this study was very similar to our research. However, in the current study, the observation time point was made continuously for 7 days post-delivery. Our study was introduced in the antenatal phase compared to many other studies that only initiate education during the post-partum phase (22-24). This study supports the existing evidence on the effectiveness of self-perineal care teaching on reducing episiotomy pain (25-27) and good wound healing outcomes (27, 28).

A quasi-experiment conducted in Jos, Nigeria, showed that mothers in the intervention group who practiced perineal wound care performed better on hygiene, nutrition, and pain relief measures than mothers in the control group (27). Women who were taught post-partum perineal wound care practiced it, resulting in better wound healing. The study concluded that knowledge is crucial to enhance good practice and improve wound healing outcomes. The study's finding was consistent with the current study;

however, the novelty of our study was the use of the mobile application to provide consistent information to replace a pamphlet and self-reporting by the mothers.

The traditional method practiced among the mothers was recorded in the current study and was controlled during the statistical analysis as many mothers practice traditional methods during the postnatal period, which may also affect the study's wound healing outcome. A mixed-method research reported that traditional Baluch healers used Mastic oleoresin (MO) to precipitate wound healing and relieve episiotomy pain (29) and resulting in the healing rates in the intervention group being higher than in the control group. Contrary to our findings, other studies have shown that numerous herbal medicines are also beneficial in wound care (30-32).

The strength of our study was that various non-pharmacology methods were used to reduce pain levels and improve wound healing. All of these methods were included in our SPC educational program /package. The SPC education was aided by mobile application and was performed as early as the antenatal phase.

The present study also had some limitations. It was conducted in two tertiary care hospitals in an urban setting, Klang Valley, Malaysia. Therefore, maternal exposure to the self-education programs and the ability to follow instructions via mobile applications would be better, limiting the generalization to rural area health facilities in Malaysia. Self-reported observations of pain levels and wound healing outcomes could be biased to the study results as mothers may not have described the actual condition.

6. Conclusion

Based on the present study's findings, SPC education administered as early as the prenatal phase positively affects episiotomy pain score reduction and improves wound healing outcomes. Self-reporting using a mobile application on pain score and wound healing outcome empowers mothers to take responsibility for their health. This program suggests that this education should be continued, expanded (perhaps with the "SPCE"

mobile application), implemented by other researchers, and develop its proven potential to reduce pain scores and improve wound healing outcomes in Malaysia and elsewhere.

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Footnotes

Conflicts of Interest: This research project has no conflict of interest.

Authors' contributions: LML: Methodology, data collection, data analysis and interpretation, article drafting, and revising.

LML CMC, V.R., NMA, K.C., LFL, and S.M: Methodology and final approval of the manuscript.

All authors contributed substantially to the manuscript revision.

LML and CMC: Take accountability for the paper.

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