Introduction

Vaginal delivery offers many benefits such as a rapid postpartum recovery process and an early start to the mother–infant relationship; but, it can be associated with perineal trauma [1]. Perineal pain affects physical, psychological, and social well-being of the mother in the postpartum period. It can also disrupt breastfeeding, family life, and sexual relations [2]. Most women experience perineal pain during the postpartum period [3,4]. The perineal pain that persists for hours after delivery results in feelings of discomfort during physical activities, elimination, insomnia, and short-term interference with infant care and breastfeeding. In the long-term, it may give rise to depression, maternal anxiety, stress urinary incontinence, dyspareunia, communication problems, irritability, and fatigue [5,6]. Health care professionals need to actively promote the ways to assist women to manage their perineal pain experiences as this will help them to be adapted to motherhood more easily [7].

Postpartum perineal pain adversely affects daily activities, infant care, and comfort levels of mothers. It is very important to determine comfort levels of postpartum women during the postpartum period in terms of identifying and solving problems experienced by women during the postpartum period [8].

Perineal pain should regularly be monitored [9] to facilitate mothers’ adaptation to the postpartum period, the early onset and continuation of lactation, and mother–infant interaction as well as accelerating the recovery process and preventing complications [10]. The approach for treatment of postpartum perineal pain includes various pharmacological methods such as oral and local anesthetics and nonpharmacological methods such as ice packs, cold/ice baths, and seat cushions [11–13].
Cold application effectively relieves pain in two ways. Firstly, it reduces edema, panicula, and muscle spasms associated with inflammation or trauma; secondly, it relieves pain by inducing short-term paresthesia of the peripheral nerve fibers and decreasing the inflammatory response [6]. Cold application to the perineum decreases the temperature of the skin and underlying tissue, causes alpha receptors in the blood to become stimulated by the sympathetic nervous system, and decreases blood circulation to the region because of vasoconstriction, all of which reduce pain [11,14]. A systematic review has revealed the studies testing cold application durations ranging from 15 to 30 minutes [12]. Another systematic review has reported evidences indicating the temperature decrease in the first 10–20 minutes [15]. A reduction of 10 to 15°C in perineal temperature because of cold pad application performed for 10–20 minutes is considered ideal to achieve an analgesic effect [3,16]. Several studies aiming to assess perineal pain in women treated with cold gel pad after delivery have revealed a decrease in their perineal pain severities [17,18].

Cold gel pad application is an inexpensive, safe, and easy-to-use method which does not have any side effect and does not prevent breastfeeding [9]. Few randomized controlled studies have been conducted to examine cold gel pad application, which is effective in reducing postpartum perineal pain... Being carried out by nurses in health centers, most of the hot–cold applications generally require doctors' order. Nurses have important responsibilities for performing cold applications under desirable conditions. They are expected to have sufficient knowledge and skills about effects and side-effects of cold applications and necessary methods because these applications can cause important problems like numbness, pain, cold burns, and tissue damage and likely have negative effects on patients' health when they are not implemented properly and appropriate precautions are not taken. Nurses following advances in cold application methods will increase the quality of nursing care. Therefore, this study was conducted to determine the efficacy of cold gel pad application for relieving perineal pain and possibly increasing mothers' comfort in the early postpartum period after vaginal delivery and improving independent nursing practices. Furthermore, the results obtained in the study would contribute to the current literature on effects of cold applications on postpartum perineal pain.

Methods

Study design

This study was conducted with the randomized, controlled experimental design in the postpartum department of Mersin obstetrics and gynecology hospital in 2013. This hospital, having a capacity of 306 beds, was selected because it generally serves a population with low socioeconomic level and has a high number of births. Annual birth number in hospital 8,035, 62.8% (5,062) were vaginal births, 1.4% (112) were interventional vaginal births, and 35.8% (2,892) were cesarean sections. Delivery is performed by midwives; however, a specialist physician intervenes in case of a risky situation. The postpartum woman who is monitored in her bed for 2 hours is sent to the maternity ward if there is no problem. In the maternity ward in which the study was conducted, delivery nurses administer only oral analgesics prescribed by the medical doctor. They do not use any nonpharmacological method to relieve perineal pain.

Setting and sample

The G*Power 3.1 program was used to calculate the sample size. The level of perineal pain was considered as the main parameter. In the study by Sheikhan et al [19], it was found that the average pain intensity of the patients was 3.20 ± 1.58 in the experimental group and 4.23 ± 1.59 in the control group. When the alpha level was set at 0.05 and the power of the study was expected to be 90%, the minimum size calculated based on the mean pain severity was 51 patients for each one of the experimental group and the control group.

This was a single-blind study. Simple randomization, a simple probability sampling method, was used to assign the participants into the experimental and control groups. To assure randomization, the women, who met the inclusion criteria and agreed to participate in the study, were included in the study via the closed envelope method and according to the table of random numbers. In the closed envelope method, pink envelopes were used for primiparas and blue envelopes were used for multiparas to determine experimental and control groups. By using the computer-assisted randomization and the numbers ranging from 1 to 100 in the website [https://www.randomizer.org], postpartum primiparous and multiparous women presenting to the hospital were assigned into two groups including 50 women in each group.

By using the simple randomization method, the participants were assigned to the experimental group or the control group. The experimental group included 50 primiparous mothers and 50 multiparous mothers who had experienced a vaginal delivery, and the control group included the same number of primiparous and multiparous mothers (a total of 200 participants). The participants in the experimental and control groups stayed in separate wards so that they did not get in contact and interfere with each other.

The inclusion criteria were as follows:

- Giving the first, second, or third birth
- Being 18 years old and more
- Experiencing a vaginal delivery at the gestational week 37 and over
- Having no complication (hemorrhage, preeclampsia, etc.)
- Delivering a single and healthy fetus with cephalic presentation
- Going through the postpartum period of 30 minutes to 1 hour
- Not receiving any oral analgesics within 4 hours after delivery.

Ethical considerations

Before the study, the approval was obtained from the ethics committee of Mersin obstetrics and gynecology hospital (Approval no. B.30.2.1ST.0.30.90.00/26843). Before data collection, the women, who met the inclusion criteria, were informed about the informed consent form and their consent was obtained.

Measurements

The following instruments were used: information form, the visual analog scale (VAS), and the postpartum comfort questionnaire (PCQ).

Information form

The authors of this study prepared the information form according to the literature. It consisted of 42 questions determining sociodemographic characteristics such as age, education, profession, and age at marriage; general health characteristics such as smoking, chronic diseases, and medication use; and obstetric characteristics such as pregnancy, birth, and abortion.

VAS

VAS, which is used to assess pain level, is a 10-cm-long vertical line ranging from 0 to 10; 0 signifies no pain, and 10 signifies the worst pain that can be endured [20].
Temperature of perineal area

Perineal temperature was measured by using a multifunctional, sensitive, digital, noncontact thermometer before and after the application to ensure that the cold gel pads were placed on the perineum properly and the application was effective (commercial name: Comfort JT-F38 digital, multifunctional, noncontact thermometer, serial no: EN60601/CE, company: K-jump health, city: Taiwan, country: China). It can measure temperatures of objects at 0–100°C and of the body at 16–40°C. It is enough to hold the thermometer 1 cm away from the area to be measured. The start button is pressed and the blue light focuses on the area. The result of the measurement appears on the screen 2 seconds later.

PCQ

The PCQ aims to identify comfort levels of mothers after birth. Being based on the general comfort scale [21], the questionnaire was adapted into Turkish by Karakaplan and Yıldız [22]. The PCQ includes 34 items and three factors (physical, psychospiritual, and sociocultural). The first factor includes the questions about physical and bodily perceptions and constitutes the physical comfort subscale. The second factor includes the questions related to spiritual and psychological components. The third factor includes the questions related to interpersonal, familial and social relationships and financial and support systems and constitutes the sociocultural subscale. A five-point Likert scale is used to assess the items measured in the PCQ. The responses and the scores range from strongly agree (5 points) to strongly disagree (1 point). The expression strongly agree in positive sentences signifies the highest comfort (5 points); whereas in negative sentences, it indicates the lowest comfort (1 point). The total score obtained from the scale is divided by the number of items to calculate a mean score of 1–5. While one point shows low comfort, five points show high comfort. Before conducting the study, permission was obtained from Karakaplan and Yıldız to use the scale. In this study, Cronbach α was found as α = .78 [22]. Cronbach α of the scale was found to be .72 in the present study.

Data collection

The researchers used the aforementioned questionnaires and the face-to-face interview method. They are obstetric nursing specialists and conducted the whole study process in cooperation with the nurses in the clinic. The women in both experimental and control groups were asked to use the VAS to show the level of perineal pain they felt while performing activities. Once perineal temperature was measured, PCQ was administered.

Cold gel pad application

ThermoJEL cold/hot pack gel pads were used for cold application (year of manufacture: 2009, serial no: rtm8680434323856, company: Artimed, city: Istanbul, country: Turkey). Being applied as hot or cold compresses, the gel pads are available in individual packages. During the study, 100 patented gel pads, approved by the Ministry of Health, were used as cold gel pads. Each gel pad had an approximately 5 cm width, 23 cm length, and 1.5 cm thickness. The instructions on the packaging were followed while using them. They were kept in the freezer at −10°C for 45–60 minutes and removed in the form of ice. Then, they were wrapped in a sterile pad and applied to cover the perineum and anal region. The pads were compatible with the anatomical structure of the perineum. No side-effect was observed in the patients after the cold gel pad application.

The experimental group was treated with cold gel pad application for approximately 20 minutes within postpartum 2 hours and pain was evaluated by using the VAS. The perineal temperature was measured before and after the application by using a precise, digital, multifunctional, noncontact thermometer to determine the effect of the gel pad application.

Two hours after the first cold application, the participants were asked to indicate the level of perineal pain they felt during daily activities using the VAS and the perineal temperature was measured.

The cold gel pad was applied for the second time for 4 hours after the first application, and the processes were repeated. Compared with the experimental group, the control group was treated with a hygienic absorbent maternity pad rather than a cold gel pad for the same duration and within the same period. The participants in this group completed the same instruments in the same manner as the experimental group (Figure 1).

Each woman completed gel pad application and pain assessment for about 30 minutes and they did not have any negative response during this period.

Data analysis

The statistical analyses were performed by using the SPSS 21.0 (IBM Corp., Armonk, NY, USA). The value of p < .05 was considered as statistically significant. For continuous measurements, independent samples t test and the paired samples t test, which are the parametric tests, were used to analyze the differences between the primipara and the multipara. In addition, a nonparametric test, Wilcoxon signed rank test was used to compare numerical values obtained from the two dependent groups.

Results

The average age of the primiparous women was 22.92 ± 3.14 years, the average age of multiparous women was 25.02 ± 5.13 years, and the women’s average age at marriage was 20.14 ± 3.71 years. Sixty-one percent of all the participants were primary school graduates and 97.5% were housewife. The experimental and control groups were similar in terms of sociodemographic and obstetric characteristics.

No statistically significant difference was observed in the groups in terms of obstetric characteristics such as the number of miscarriages/abortions, the number of deliveries, the duration between the last two births and the birth weights of first- and second-born infants of the women. All the primiparous women and 72.0% of the multiparous women in the experimental group and 67.0% of the multiparous women in the control group had episiotomy.

The mean perineal temperature after the first and second cold applications decreased between the experimental and control groups at a statistically significant level (p < .001; Table 1).

Comparison of the VAS scores

The evaluation of the pain severity in the experimental and control groups based on the VAS scores showed no significant difference before the first and second cold gel pack applications (p > .05); however, the difference between the experimental and control groups was statistically significant after the application. Cold gel pad application reduced the perineal pain in primiparous and multiparous women (Table 2).

The perineal pain experienced by the primiparous and multiparous women in the experimental group during sitting, walking, and breastfeeding significantly decreased after the cold gel pad application (p < .001). When the experimental and control groups were compared, the experimental group had significantly lower VAS mean scores during some activities such as sitting, walking, and breastfeeding after cold gel pad application (p < .001).
The results showed that the PCQ mean scores increased between the first and last assessments for both the primiparous and multiparous women, and the difference between them was statistically significant (p < .001). When the experimental and control groups were compared in terms of PCQ mean scores, there was no significant difference (p > .05) in the first assessment, but there was a significant difference (p < .05) in the last assessment (Table 3).

### Table 1: The Comparison of Perineal Temperatures in the Groups After the First and the Second Cold Applications (N = 200).

<table>
<thead>
<tr>
<th>Perineal temperature (°C)</th>
<th>Experimental group (n = 100)</th>
<th>Control group (n = 100)</th>
<th>Z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primipara</td>
<td>Multipara</td>
<td>Total</td>
<td>Primipara</td>
</tr>
<tr>
<td>Before the first cold application</td>
<td>36.86 (0.18)</td>
<td>36.86 (0.14)</td>
<td>.34</td>
<td>.732</td>
</tr>
<tr>
<td>After the first cold application</td>
<td>24.45 (0.72)</td>
<td>25.46 (0.45)</td>
<td>.03</td>
<td>.972</td>
</tr>
<tr>
<td>Z</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before the second cold application</td>
<td>36.96 (0.11)</td>
<td>36.89 (0.14)</td>
<td>.283</td>
<td>.005</td>
</tr>
<tr>
<td>After the second cold application</td>
<td>25.52 (0.61)</td>
<td>25.46 (0.43)</td>
<td>.93</td>
<td>.352</td>
</tr>
<tr>
<td>Z</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
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</tbody>
</table>

Note: SD = standard deviation; Z = Wilcoxon signed rank test.

### Discussion

Perineal pain developing during the postpartum period can affect women's relationships with their families and infants in addition to their general physical and psychological well-being. In vaginal deliveries, the pain that is initially perceived for a short time emerges as a result of perineal tissue stress and tear. This pain is transmitted through afferent pathways in pudendal nerves (S2–S4) and continues for approximately 2–4 weeks depending on perineal trauma [23]. There is only limited evidence supporting the effectiveness of...
local cooling treatments (ice packs, cold gel pads, cold/iced baths) applied to the perineum after childbirth to relieve pain [14].

There are a wide variety of protocols about duration, frequency, and maintenance of the ice pad application. Duration of this application ranges from 15 to 30 minutes [6]. The cold application, which has been used to relieve pain for centuries, enables a decrease of 15°C in temperature within 2–5 minutes. This decrease can only be 5°C with a 20 minutes application for deeper tissues [13].

Several studies have shown that the cold application was effective in decreasing the perineal temperature by 10–15°C, but parity, type of birth, severity of perineal trauma, duration of the application, and possible side-effects should be taken into consideration [11]. In addition, the cold application longer than the recommended may lead to disruption of the circulation and tissue damage because of oxygen and nutrition deficiency. It is recommended in the literature that the cold application should be performed at 2-hour intervals and for 15 minutes each [26]. The cold application signiﬁcantly decreased perineal pain and the primiparous women reported a substantially greater decrease in their pain compared with the control group [17]. Preceding studies reported a statistically signiﬁcant decrease in pain mean score [17].

In this study, a cold pad application signiﬁcantly decreased perineal pain and the primiparous women reported a substantially greater decrease in their pain levels. The results of this study support that the application of an ice pack for 20 minutes can be effective in reducing perineal pain.

Previous studies have revealed that cold gel pad application decreases pain in primiparous women [27]. A study conducted on primiparous women to assess their perineal pain showed a statistically signiﬁcant decrease in pain in the experimental group receiving cold gel pad treatment for 20 minutes at postpartum 4th hour, 12th hour, and 5th day compared with the control group [18]. Another study on primiparous women revealed that the group of mothers treated with a cold gel pad had a statistically signiﬁcant decrease in their pain compared with the control group [17]. Preceding studies reported a signiﬁcant decrease in the pain mean score.
after a 20 minutes cold application and showed that this application duration was effective in reducing the perineal pain after vaginal delivery [13].

In the present study, the pain levels of both multiparous and primiparous women decreased significantly after cold gel pad application. Perineal pain and discomfort restrict mothers’ activities, decrease their movements, delay urination and defecation, and increase difficulties in infant care and breastfeeding by adversely affecting mobility.

A study reported that the mothers experienced a moderate pain during daily activities such as lying down, sitting, and walking [16]. Another study that the group receiving the cold gel pad application had a higher decrease in pain during sitting, infant care, and urinating compared with the group not receiving the application [28]. Similarly, the present study revealed that the pain experienced during daily activities such as sitting, walking, breastfeeding, and urinating decreased in the group treated with a cold gel pad applied to the perineal region. The results of both the present study and previous studies show that postpartum perineal pain restricts women’s daily activities and ability to care for their infants.

Physical comfort is affected by physical perceptions and includes physiological factors such as resting and relaxation, reactions to diseases, nutrition and homeostasis, and bowel functions [8]. The physical comfort mean scores were 3.19 ± 0.30 in the experimental group and 2.94 ± 0.31 in the control group, and this difference was statistically significant.

Psychospiritual comfort involves feelings such as self-respect, self-concept, sexuality, and self-awareness. The factors which reduce psychospiritual comfort are pain anxiety, doubt, and sudden changes in condition [8]. The psychospiritual comfort mean scores were found to be higher in the experimental group (1.89 ± 0.27) than the control group (2.10 ± 0.23). This difference is thought to be associated with the reduction in pain after cold application in the experimental group.

Sociocultural comfort includes factors such as information and counseling, providing care in accordance with the traditions and religious beliefs of the family [8]. There was no statistically significant difference between the experimental and control groups in terms of sociocultural comfort mean scores.

In the present study, the primiparous and multiparous women had similarly high rates of satisfaction with the results of the cold gel pad application. Postpartum perineal pain restricts mothers’ daily activities and infant care abilities and reduces their comfort. While previous studies focused on primiparous women and/or women who had an episiotomy, the present study specified that multiparous women experienced the same problems and the use of cold gel pad reduced their pain and increased their comfort.

The strengths and limitations of the study

The strengths of this study were that it was randomized-controlled, had a sufficient sample size, and had the subgroups of primiparous and multiparous women. Also, the effects of the cold application were evaluated in a multidimensional way.

The limitation of this study was that the cold gel pad application was performed two times after delivery and that no observation was made at home. Different cold application methods in different durations and frequencies were not used. Because of the additional problems associated with grand multiparity, the woman who had experienced four or more births were not included.

Conclusion

The present study, which provides evidence on nursing practice, showed that a cold gel pad application was effective in relieving perineal pain after vaginal deliveries. There was a statistically significant decrease in the pain felt by primiparous and multiparous women during the recovery and the daily activities such as lying down, sitting and walking, infant care, breastfeeding, and urination; however, the primiparous women reported a greater decrease in the perineal pain level compared with the multiparous women.

The results suggest that it is necessary to establish standards related to the application of cold gel pads on the perineal site during the postpartum period and the use of cold gel pads in women without episiotomies. In addition, it can be recommended to conduct studies using applications in different frequencies and lasting longer time.

Conflict of interest

The authors declared no potential conflicts of interest with respect to research, authorship, and/or publication of this article.

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References


