

## Original Article

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# The Use of Honey and Curcumin for Episiotomy Pain Relief and Wound Healing: A Three-Group Double-Blind Randomized Clinical Trial

Maryam Nikpour<sup>1</sup>, Mouloud Agajani Delavar<sup>2</sup>, Soraya Khafri<sup>3</sup>, Azita Ghanbarpour<sup>2</sup>, Ali Akbar Moghadamnia<sup>4</sup>, Sedighe Esmaeilzadeh<sup>2</sup>, Fereshteh Behmanesh<sup>2</sup>

<sup>1</sup>Social Determinants of Health Research Center, <sup>2</sup>Infertility and Reproductive Health Research Center, <sup>3</sup>Department of Social Medicine and Health, <sup>4</sup>Department of Pharmacology, Babol University of Medical Sciences, Babol, Iran

### ORCID:

Nikpour M: <https://orcid.org/0000-0001-6821-0010>;

Agajani Delavar M: <https://orcid.org/0000-0001-6906-1440>;

Khafri S: <https://orcid.org/0000-0002-2398-7560>;

Ghanbarpour A: <https://orcid.org/0000-0001-7101-3261>;

Moghadamnia AA: <https://orcid.org/0000-0001-7140-1352>;

Esmaeilzadeh S: <https://orcid.org/0000-0002-1951-1367>;

Behmanesh F: <https://orcid.org/0000-0001-5837-4265>

### ABSTRACT

**Background:** Episiotomy is the most common surgical procedure in obstetrics. It may be associated with wound infection and delayed wound healing. **Objectives:** This study aimed to compare the effects of honey and curcumin on episiotomy pain and wound healing. **Methods:** This double-blind three-group randomized controlled trial was done on 120 women admitted for vaginal delivery to Shahid Yahyanejad hospital, Babol, Iran. Participants were randomly assigned to three groups of 40 subjects and were taught to apply honey, curcumin, or placebo creams on their own episiotomy wound twice daily for 10 successive days after birth. Pain and wound healing were assessed 2 h, 5 days, and 10 days after birth via a visual analog scale and the Redness, Edema, Ecchymosis, Discharge, and Approximation scale. The primary outcomes of the study were episiotomy wound healing and pain intensity. The Chi-square test as well as the one-way analysis of variance and the repeated measures analyses of variance were conducted for data analysis. **Results:** The study was completed with 30 women in each of the honey and the curcumin groups and 29 in the placebo group. There were no statistically significant differences among the groups respecting the variations of pain intensity and wound healing mean scores across the three measurement time points. However, based on the complete pain relief on the 10<sup>th</sup> day and compared with the placebo group, number-to-treat values in the curcumin and the honey groups were around 6 and 5, respectively. Moreover, compared with the placebo group, number-needed-to-treat values for complete wound healing on the 10<sup>th</sup> day in the curcumin and the honey groups were 6 and 8, respectively. **Conclusion:** Curcumin and honey creams have almost the same effects on episiotomy wound healing and pain intensity.

**KEYWORDS:** Curcumin, Episiotomy, Honey, Pain, Wound Healing

## INTRODUCTION

During vaginal delivery, the soft tissue of the birth canal and the perineum are damaged either spontaneously or due to episiotomy.<sup>[1]</sup> Any delay in the healing of the resultant wound can increase the risk of wound infection,<sup>[2]</sup> alter muscular structure, and eventually cause the loss of muscle tone.<sup>[3]</sup> Therefore, wound care is of particular importance to postnatal maternal outcomes and can facilitate women's return to normal life.<sup>[4]</sup> At present, all efforts are focused on the

early and effective treatment of perineal injuries and their associated complications.<sup>[5]</sup>

There is a wide range of topical and systemic treatments for the management of perineal injuries. Topical

**Address for correspondence:** Dr. Fereshteh Behmanesh, Infertility and Reproductive Health Research Center, Babol University of Medical Sciences, Babol, Iran.  
E-mail: [f.behmanesh2015@gmail.com](mailto:f.behmanesh2015@gmail.com)

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treatments have fewer side effects and hence are commonly considered as the treatment of choice for such injuries.<sup>[6]</sup> These treatments include lidocaine gel as well as herbal compounds with anti-inflammatory and wound healing effects<sup>[7]</sup> such as lavender,<sup>[8]</sup> chamomile,<sup>[4]</sup> marigold,<sup>[9]</sup> honey,<sup>[10,11]</sup> and turmeric.<sup>[12]</sup>

Honey, referred to in the Holy Quran as a healing agent,<sup>[13]</sup> has antimicrobial and anti-inflammatory effects, can stimulate angiogenesis and epithelialization, and hence, is considered as a wound healing agent. Its effects are attributed to its high osmolality, acidity, and components such as hydrogen peroxide, flavonoids, and phenolic acids.<sup>[14]</sup>

Turmeric is another medicinal plant with a long history of medical use.<sup>[15]</sup> Curcumin, obtained from the dried rhizomes of turmeric plant, contains 5% curcuminoids,<sup>[16]</sup> which have anti-inflammatory, antibacterial, antiviral, and wound healing effects.<sup>[17]</sup> It also promotes collagen formation and increases the vascular density and fibroblast number in wounds.<sup>[18]</sup> An animal experiment reported that honey and turmeric ointments were effective in promoting wound healing.<sup>[19]</sup> However, comparative studies on the effects of honey and phenytoin found the insignificant effects of honey on wound healing and pain intensity among women with episiotomy<sup>[20]</sup> and on wound healing among patients with leg ulcers.<sup>[21]</sup> Thus, it is yet unknown whether honey and curcumin can positively affect wound healing and episiotomy pain.

### Objectives

This study aimed to compare the effects of honey and curcumin on episiotomy pain and wound healing.

## METHODS

### Study design, setting, and participants

As a double-blind three-group randomized controlled trial, this study was done from October 2014 to May 2016. The study population consisted of pregnant women who referred for vaginal delivery to Shahid Yahyanejad hospital, Babol, Iran. The sample size was calculated based on the results of an earlier study into the effects of honey gel on wound healing after cesarean section which reported the mean score of  $0.47 \pm 0.84$  in the honey group and  $1.59 \pm 1.95$  in the control group for wound healing.<sup>[10]</sup> Hence, with a  $\beta$  of 0.20, an  $\alpha$  of 0.05, a  $S_1$  of 0.84, a  $S_2$  of 1.95, a  $\mu_1$  of 0.47, and a  $\mu_2$  of 1.59, the sample size was estimated to be 30 for each group. However, considering the possible attrition 40 women were recruited to each group.

In total, 120 women were consecutively recruited and randomly assigned to the honey, the curcumin, or the placebo groups. Randomization was done using a

computer-generated table of random numbers. Inclusion criteria were an age of 17–35 years, a gestational age of 37–42 weeks, no smoking and drug abuse, no history of health conditions which could negatively affect wound healing (such as diabetes mellitus, kidney diseases, or severe anemia), no use of medications which could affect wound healing, no perineal hematoma, no abnormal vaginal bleeding after birth, no third-degree or fourth-degree perineal tear, and no infantile hospitalization for >7 days. Participants who irregularly used the allocated treatment or failed to refer to the study setting for follow-up visits and assessments (on the 5<sup>th</sup> and the 10<sup>th</sup> postpartum days) were excluded from the study.

### Questionnaires

A questionnaire was primarily used to gather data on participants' demographic and labor characteristics, namely, age, education level, employment status, income level, labor duration, episiotomy suture duration, husbands' education level and employment status, neonatal birth weight, and neonatal birth head circumference. Moreover, pain assessment was done in the sitting position using a 10-cm visual analog scale which measured pain on from 0 ("no pain") to 10 ("worst pain") scale.<sup>[22]</sup> Wound healing assessment was done at three time points, namely, 2 h, 5 days, and 10 days after birth, using the Redness, Edema, Ecchymosis, Discharge, and Approximation (REEDA) scale while women were in the lithotomy position. The items of the REEDA scale were scored on a Likert-type scale from 0 ("not occurred") to 3 ("severe problem"). The validity and reliability of the REEDA scale had been previously confirmed.<sup>[23]</sup>

### Intervention

During hospital stay, the first author provided each participant in the honey, the curcumin, and the placebo groups with a single pack of, respectively, honey, curcumin, and placebo cream and asked her to use creams twice daily for 10 successive days after birth. For cream application, they were also taught to wash and dry their hands using a clean towel and then, place the allocated cream on episiotomy sutures to completely cover the area. All of them had received a 2 g dose of prophylactic intravenous cefazolin immediately after birth and were treated with cephalexin 500 mg capsules every 6 h for 7–8 successive days. They were also provided with the opportunity to take mefenamic acid 25 mg as needed for pain management during the 10-day course of the study. Mefenamic acid use was assessed as the secondary outcome of the study. All participants were also asked to report any treatment side effects.

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### Drug preparation

Drug preparations were 40 tubes of placebo, 40 tubes of curcumin cream 2%, and forty tubes of honey 35%. All tubes were in metal and weighed 30 mg. Placebo tubes contained glycerin, Carbopol, eucerin triethanolamine, propylparaben, distilled water, and food dye (i.e., curcumin 0.1%). Honey cream tubes contained the same ingredients as placebo tubes plus honey at a concentration of 35%. Placebo and honey creams were produced by the pharmacology laboratory of Babol University of Medical Sciences, Babol, Iran, while curcumin tubes were filled with pure curcumin 2% produced by Merck Company (Germany). The compositions of the preparations were determined based on an earlier study.<sup>[10]</sup> To produce placebo and honey creams, Carbopol was added to deionized and autoclaved water and stored for 24 h in an environment like laminar flow, and then, it was mixed at 400 rpm. Finally, other ingredients were added. Besides, invert sugar testing was performed for the standardization of the products. All tubes were the same in shape and weight and were coded by a pharmacist as 1, 2, or 3. Therefore, not only participants but also the authors were blind to the contents of the tubes.

### Ethical considerations

This study was registered in the Iranian Registry of Clinical Trials (registration code: IRCT201108087257N1) and approved by the Ethics Committee of Babol University of Medical Sciences, Babol Iran (approval code: MUBABOL. REC.1390.4). All participants were provided with explanations about the aim of the study and were ensured of the confidentiality of data management and voluntariness of participation in the study. Then, personal written informed consent was obtained from each of them. All procedures were performed in accordance with the ethical principles of the Institutional and National Research Committee and also the latest update of the Helsinki Declaration.

### Data analysis

Data analysis was performed using the SPSS software version 16.0 (SPSS Inc. Chicago, IL, USA). Normality was tested via the Kolmogorov–Smirnov test and baseline group comparisons respecting participants' characteristics were made through the Chi-square test and the one-way analysis of variance (ANOVA). The primary outcomes of the study were episiotomy wound healing and pain intensity, while the secondary outcomes were analgesic use and treatment side effects. The repeated measures ANOVA was used to evaluate the variations of episiotomy wound healing and pain intensity scores across the three measurement time points. Moreover, the data were

analyzed based on the intention-to-treat (ITT) analysis. The number-needed-to-treat (NNT) value was also determined based on the number of women with complete wound healing and the number of women with complete pain relief on the 10<sup>th</sup> day. The level of significance was set at  $<0.05$ .

## RESULTS

Initially, 40 women were recruited to each group. However, some of them were excluded, and thus, the number of patients whose data were finally analyzed was thirty in each of the honey and the curcumin groups and 29 in the placebo group [Figure 1]. Participants' age was  $24.70 \pm 4.00$  on average and most of them were housewives and had high school education. The three groups of the study did not significantly differ from each other respecting the baseline characteristics of participants, their husbands, and their infants ( $P > 0.05$ ) [Table 1].

Table 2 shows the mean scores of wound healing and pain intensity in the three study groups at the three measurement time points. There were significant within-group decreases in all study groups respecting the mean scores of both wound healing and pain intensity ( $P < 0.001$ ). However, there were insignificant differences among the groups respecting wound healing and pain intensity scores ( $P = 0.253$  and  $0.547$ , respectively). The interaction of time and group was also statistically insignificant for wound healing and pain intensity scores ( $P = 0.478$  and  $0.540$ ), respectively [Table 2].

The number of women with complete pain relief on the 10<sup>th</sup> day was 9 (30%) in the curcumin group, 10 (33.3%) in the honey group, and 4 (13.8%) in the placebo group. Thus, compared with the placebo group, NNT in the curcumin and the honey groups was around 6 and 5, respectively. Moreover, NNT in the honey group compared with curcumin was around 33.

The number of women with complete wound healing on the 10<sup>th</sup> day was 4 (13.3%) in the curcumin group, 6 (20.0%) in the honey group, and 2 (6.9%) in the placebo group. Thus, compared with the placebo treatment, NNT for the curcumin and the honey treatments was around 13 and 8, respectively. Moreover, NNT for honey compared with curcumin was around 15.

Participants were also examined respecting the side effects of the treatments (i.e., tingling and itching) as well as analgesic and antibiotic use. Most participants in all groups had no tingling and itching and regularly used the prescribed antibiotics. Therefore, groups did not significantly differ from each other respecting analgesic and antibiotic use and tingling and itching prevalence ( $P > 0.05$ ) [Table 3].

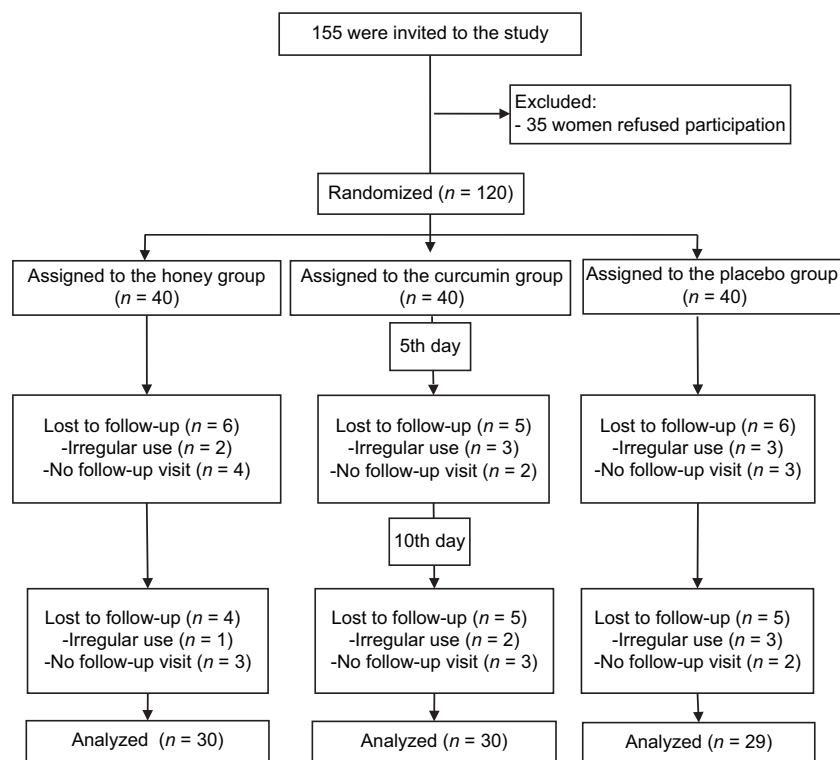


Figure 1: The flow of participants in the study

Table 1: Group comparisons respecting the characteristics of participants, their husbands, and their infants

| Characteristics                              | Groups <sup>a</sup> |               |                | P                 |
|--|---------------------|---------------|----------------|-------------------|
|  | Curcumin (n=30)     | Honey (n=30)  | Placebo (n=29) |                   |
| Participants' age (years)                    | 24.47 ± 3.93        | 25.12 ± 3.72  | 24.39 ± 4.21   | 0.60 <sup>b</sup> |
| Neonatal birth weight (g)                    | 3362 ± 42.13        | 3239 ± 35.69  | 3243 ± 29.65   | 0.73 <sup>b</sup> |
| Neonatal birth head circumference (cm)       | 33.51 ± 0.42        | 32.48 ± 0.35  | 32.79 ± 0.42   | 0.28 <sup>b</sup> |
| Episiotomy suture time (min)                 | 31.66 ± 14.55       | 32.91 ± 14.12 | 30.49 ± 13.0   | 0.30 <sup>b</sup> |
| Participants' education level                |                     |               |                |                   |
| Below diploma                                | 11 (36.7)           | 12 (40.0)     | 9 (31.0)       | 0.93 <sup>c</sup> |
| Diploma                                      | 14 (46.7)           | 14 (46.7)     | 14 (46.7)      |                   |
| University                                   | 5 (16.7)            | 4 (13.3)      | 6 (20.7)       |                   |
| Husbands' education level                    |                     |               |                |                   |
| Below diploma                                | 16 (53.3)           | 15 (50.0)     | 13 (44.8)      | 0.80 <sup>c</sup> |
| Diploma                                      | 14 (46.7)           | 15 (50.0)     | 16 (55.2)      |                   |
| Participants' employment status <sup>d</sup> |                     |               |                |                   |
| Housewife                                    | 24 (80.0)           | 25 (83.3)     | 24 (82.8)      | 0.93 <sup>c</sup> |
| Employed                                     | 5 (20.0)            | 5 (16.7)      | 5 (17.2)       |                   |
| Income level                                 |                     |               |                |                   |
| Low  | 7 (23.3)            | 6 (20.0)      | 6 (20.7)       | 0.94 <sup>c</sup> |
| Moderate                                     | 23 (76.7)           | 24 (80.0)     | 23 (79.3)      |                   |
| Delivery agent                               |                     |               |                |                   |
| Resident                                     | 4 (13.3)            | 5 (16.7)      | 5 (17.2)       | 0.90 <sup>c</sup> |
| Midwife                                      | 26 (86.7)           | 25 (83.3)     | 24 (82.8)      |                   |

<sup>a</sup>Data presented as mean ± SD or n (%); <sup>b</sup>The results of the one-way analysis of variance; <sup>c</sup>The results of the Chi-square test. <sup>d</sup>One subject did not respond to this question; SD: Standard deviation

## DISCUSSION

This study showed no significant difference among the three groups regarding pain intensity across the three measurement time points. Similarly, two earlier studies

reported that honey had no significant effects on pain intensity<sup>[4]</sup> and wound healing,<sup>[24]</sup> while a study showed the positive effects of honey cream on pain intensity after cesarean section.<sup>[11]</sup> The insignificant difference



**Table 2: Between- and within-group comparisons respecting episiotomy pain intensity and wound healing across the three measurement time points**

| Variables/group | Time <sup>a</sup> |              |                            | P      |              |       |
|-----------------|-------------------|--------------|----------------------------|--------|--------------|-------|
|                 | 2 h after         | 5 days after | 10 <sup>th</sup> day after | Time   | Time × group | Group |
| Pain intensity  |                   |              |                            |        |              |       |
| Curcumin        | 3.80 ± 2.04       | 3.90 ± 2.40  | 2.06 ± 2.06                | <0.001 | 0.478        | 0.253 |
| Honey           | 4.20 ± 2.42       | 2.83 ± 1.72  | 1.36 ± 1.24                |        |              |       |
| Placebo         | 4.14 ± 2.27       | 3.69 ± 2.17  | 1.96 ± 1.42                |        |              |       |
| P               | 0.762             | 0.121        | 0.202                      |        |              |       |
| Wound healing   |                   |              |                            |        |              |       |
| Curcumin        | 2.47 ± 1.40       | 2.47 ± 1.25  | 1.63 ± 1.27                | 0.002  | 0.540        | 0.547 |
| Honey           | 2.30 ± 1.60       | 2.00 ± 1.50  | 1.73 ± 1.41                |        |              |       |
| Placebo         | 2.79 ± 1.84       | 2.21 ± 1.17  | 1.83 ± 1.10                |        |              |       |
| P               | 0.498             | 0.395        | 0.842                      |        |              |       |

<sup>a</sup>Data presented as mean ± SD. SD: Standard deviation

**Table 3: Group comparisons respecting side effects, analgesic use, and antibiotic use**

| Variables            | Groups             |                 |                   | P <sup>b</sup> |
|----------------------|--------------------|-----------------|-------------------|----------------|
|                      | Curcumin<br>(n=30) | Honey<br>(n=30) | Placebo<br>(n=29) |                |
| Tingling and itching | N (%) <sup>a</sup> | N (%)           | N (%)             |                |
| Yes                  | 7 (23.3)           | 6 (20.0)        | 7 (24.1)          | 0.921          |
| No                   | 23 (76.7)          | 24 (80.0)       | 22 (75.9)         |                |
| Use of analgesic     |                    |                 |                   |                |
| Yes                  | 14 (46.7)          | 15 (50.0)       | 21 (72.4)         | 0.097          |
| No                   | 16 (53.3)          | 15 (50.0)       | 8 (27.6)          |                |
| Use of antibiotics   |                    |                 |                   |                |
| Regular              | 24 (80.0)          | 22 (73.3)       | 24 (82.8)         | 0.66           |
| Irregular            | 6 (20.0)           | 8 (26.7)        | 5 (17.2)          |                |

<sup>a</sup>Data presented as Number (percent); <sup>b</sup>Chi-square test

among the groups in the present study may be because all women in all groups might have had close adherence to our educations about the daily washing of the perineal area. Moreover, all of them received the same antibiotics as part of the routine postpartum treatment regimen, and hence, they mostly showed wound healing and experienced pain relief.

Study findings also indicated downward trends in the mean score of the REEDA scale in all groups, resulting in no significant difference among the groups respecting wound healing variations across the three measurement time points. In line with our findings, an earlier study also showed no significant difference between daily washing of the perineal area and honey cream application to the area respecting wound healing.<sup>[24]</sup> Another study also reported that honey and curcumin similarly reduced wound healing time.<sup>[19]</sup> The insignificant difference among the three groups of the present study respecting wound healing is attributable to the same prophylactic antibiotic and wound care regimens for all women.

Despite the insignificant differences among the groups respecting episiotomy pain intensity and wound healing, NNT analysis showed that the number of women who needed treatments for total pain relief and wound healing in the curcumin and the honey groups was less than the placebo group. This finding implies the clinically significant effects of both honey and curcumin on pain relief and wound healing. The pain-reducing effects of honey can be attributed to its effectiveness in reducing the synthesis of prostaglandins E<sub>2</sub> and F<sub>2</sub>-alpha and thromboxane B<sub>2</sub>.<sup>[10]</sup> On the other hand, curcumin reduces inflammation in injured tissues through reducing the activity of enzymes such as cyclooxygenase, lipoxygenase, and nitric acid synthase.<sup>[12,19]</sup>

NNT values for the curcumin and the honey treatments were, respectively, around 6 and 5 on the 10<sup>th</sup> day of the study. These values show that among every six women who are treated with curcumin, one achieves complete pain relief, while among every five women who are treated with honey; one achieves complete pain relief on the 10<sup>th</sup> day of the treatments. The ideal NNT values are numbers close to one.<sup>[25]</sup>

The strength of this study was its double-blind randomized controlled trial design. Among the limitations of the study was a high attrition rate due to participants' voluntary withdrawal. Of course, we attempted to manage this limitation through NNT analysis.<sup>[26]</sup> Another limitation was related to individual differences among women respecting their perineal tissue, wound healing capability, and level of mobility, all of which might have affected both wound healing and pain intensity. Further studies are recommended to assess the effects of honey and curcumin adjusted for the effects of confounding factors which can potentially affect episiotomy wound healing.

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### CONCLUSION

Curcumin and honey have the same effects on wound healing and pain intensity among women with episiotomy. Thus, either curcumin or honey creams can be used twice daily for 10 days to promote episiotomy wound healing and reduce pain intensity after vaginal delivery.

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### Conflicts of interest

There are no conflicts of interest.

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