

## Effect of breast milk and natural drying regimens on cord separation time and signs of infection among neonates

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### Abstract

**Introduction:** In order to prevent bacterial colonization and cross infection tropical antimicrobial agent is applied to the umbilical stump at birth and for the first few days. Among those, cleaning with breast milk is one of an avenue for cord care which can be performed anywhere, requires no special equipment, which is also cost effective. Breast milk is full of mother's antibody that preventively helps babies develop immunity to illness. Breast milk contains live antibodies that fight bacteria. It is therefore a naturally existing antibacterial agent. The aim of the study was to find the effect of breast milk & natural drying modalities on cord separation time and signs of infection among neonates. An evaluative approach with post – test only design with control group was used for the study. The sample consisted of 60 neonates' selected using purposive sampling method and randomized into two groups. The findings revealed that the mean score of group 1 (20±0.00), who had been treated with breast milk was more than the group 2 (18.60± 0.932) on day seven. Among the two groups, group I had the highest F-ratio i.e 607.501. And the mean score of group 1 from day 2 to day 7 (14.13± 0.346, 17.50± 0.960, 19.20± 0.997, 20± 0.00, 20± 0.00, 20± 0.00 respectively) was more than group 2 (12± 0.830, 13.77± 0.504, 15.07± 0.365, 16.70± 0.535, 18.17± 0.648, 18.60± 0.932 respectively). This finding reveals that treatment I was found to be more effective in cord separation time. No significant association was found between treatment I and selected demographic variables whereas significant association was found between treatment II and type of delivery.

**Conclusion:** Application of breast milk hastens the cord separation time and there were no signs of infection in any of the groups. Hence breast milk is a cost effective method for umbilical cord care.

**Keywords:** Breast milk, Natural drying, Cord separation time, Signs of infection, Neonates.

### Introduction

Children are the future of our nation. In India about three by fourth of the population lives in villages. It is imperative to preserve the children and promote their wellbeing through exercising at most care in order to make them healthy and to protect them from deadly disease. It is well established that the welfare of a child and their future totally depends upon the care and attention bestowed upon him/her before and after birth.<sup>1</sup>

Newborn or Neonate is a Latin word Neonatus means Newborn. The umbilical cord connects the fetus with mother.<sup>2</sup> The placenta supplies all material for fetal growth and removes waste products.<sup>3</sup>

Umbilical cord is cut using a sterile technique, and the newborn must make the essential transition to extra-uterine life. It separates the mother and her baby both physically and symbolically.<sup>4</sup> Shortly after birth the umbilical cord occludes physiologically, halting the flow of blood.<sup>5</sup>

An umbilical cord infection among neonates in nurseries in developing countries ranges from 2 per 1000 to 54 per 1000 live births and case fatality rates ranging from 0 to 15%.<sup>6</sup> Cord infection was the source of the illness in 47% of cases, and 21% of neonates admitted for other reasons had omphalitis among the hospitalized infants<sup>7</sup>. The incidence of cord infection in Karnataka is 0.5%.<sup>8</sup> Incidence of umbilical sepsis is 30/1000 live births.<sup>9</sup>

Cord cutting and care of the umbilical stump varies according to accepted practice and culture.<sup>10</sup> Cord is cut with unsterile tools such as razors or scissors after which various substances are applied including charcoal, grease,

cow dung, or dried banana to speed up cord drying. These practices are important sources of bacterial infection and neonatal tetanus.<sup>11</sup>

### Objectives of the study

**The objectives of the study were to**

1. Determine the cord separation time and signs of infection among treatment group 1.
2. Determine the cord separation time and signs of infection among treatment group 2.
3. Compare the effectiveness of treatment 1& 2 in cord separation time and signs of infection.

### Materials and methods

An evaluative approach with post – test only design with control group was adopted. Samples were selected using purposive sampling technique and randomly assigned to each group (30 each). Observational checklist was used to observe the cord separation time and signs of infection. Expert's opinion was obtained for content validity and the reliability of the tool was tested ( $r = 0.888$ ). Institutional ethical committee clearance was obtained. Explained the purpose of the study and written consent was obtained from the mother's of newborn. The breast and the cord were cleansed with warm water and breast milk was applied within 12 hours after birth to the stump. Mother's were asked to apply two – three drop of breast milk directly from the breast to the stump, just before feeding the baby in the treatment group. After application of breast milk the cord was kept exposed until the milk gets completely dry.

Treatment was administered twice daily to the treatment group for seven days and the re-assessment was done at 2nd, 3rd, 4th, 5th, 6th and 7<sup>th</sup> day after the treatment consecutively for cord separation time and signs of infection. And in natural drying group no intervention was given, assessment was done with the same tool at 2nd, 3rd, 4th, 5th, 6th and 7th day.

## Results

The demographic characteristics of the study subjects are given in table 1.

The above data indicates that highest percentage (36.70%) of the subjects were in the age group of 21- 25 years, 63.30% belong to Hindu religion, 43.30% of the sample had high school education, 66.70% of them are home maker, 56.70% of the sample belongs to  $\leq$  2500 Rs/month income of the family, 48.30% of sample belongs to nuclear family, 70% of the samples are multi parity, 61.70% belongs to 2.5 – 3.5 kg birth weight, 88.30% belongs to 38 - 40 weeks of gestation age at the time of delivery and 60% delivered by LSCS.

Day wise assessment of the group I for the cord separation time and signs of infection reveals that 70.67% had good healing on day 2, 87.50% had healthy healing on day 3, 96% had healthy healing on day 4 and 100% had healthy healing from day5 onwards.(Table 2)

Day wise assessment of the group II for the cord separation time and signs of infection reveals that 60% had moderate healing on day 2, 68.83% had good healing on day 3, 75.33% had good healing on day 4, 83.50% had good healing on day 5, 90.83% had healthy healing on day 6 and 93% had healthy healing on day 7.(Table 3)

Comparison of treatments within the groups in terms of duration of cord separation time and signs of infection using One – way Analysis of variance from day 2 to day 7, among two groups after the two modalities of treatment shows that the mean score of group I (20.00  $\pm$  0.00), who had been treated with breast milk was more than the group II (18.60  $\pm$  0.932) on day 7. The two modalities had a significant effect in cord separation time at  $p < 0.001$ . Among the two groups, group I had the highest F-ratio i.e 607.501. This indicates that among the two modalities treatment I (treated with breast milk) was found to be more effective (Table.4).

Comparison of treatment between the groups using unpaired ‘t’ test shows that in all the 7 days after the two modalities of treatment the mean score of group 1(14.13  $\pm$  0.346, 17.50  $\pm$  0.960, 19.20  $\pm$  0.997, 20  $\pm$  0.00, 20  $\pm$  0.00, 20  $\pm$  0.00 respectively), who had been treated with breast milk was more than the group 2(12  $\pm$  0.830, 13.77  $\pm$  0.504, 15.07  $\pm$

0.365, 16.70  $\pm$  0.535, 18.17  $\pm$  0.648, 18.60  $\pm$  0.932 respectively). The two modalities had a significant effect in cord separation time and signs of infection from day 2 to day7 at  $p < 0.001$ . Among all the days, day 5 had the highest ‘t’ value i.e. 33.786. This indicates that group I treated with breast milk was found to be more effective (Table 5).

Comparison between two groups shows that, 30% neonate’s cord separated on day 3, 46.67% on day 4 and 23.33% on day 5 in group 1, whereas in group 2, 10% neonate’s cord separated on day 6, 20% on day 7 and 70% was more than 7 days (Table 6).

Chi square value of selected maternal socio-demographic and neonatal characteristics and breast milk application are not significant at 0.05 levels (Tab.7). Whereas there was no significant association was found between natural drying and selected maternal socio-demographic and neonatal characteristics expect type of delivery (Table 8).

The findings of the study is consistent with a randomized clinical trial reports where significantly shorter mean cord separation time in the breast milk group (6.35  $\pm$  2.03 days) than in the dry cord care group (7.31  $\pm$  2.44 days).<sup>12</sup> It is also consistent with the findings of cord separation times were shorter in the dry care or topical milk group than those in povidone - iodine group.<sup>13</sup> Cord separation time occurred early for neonates in the breast milk group compare to neonates in the distilled water group (5.60 + 1.04 & 7.92 + 1.08 days, respectively). Neonates in the breast milk group and distilled water group had very low bacterial colonization (14% & 10%, respectively) with no statistical significance difference between groups ( $X^2 = 0.37$ ,  $P = 0.76$ ).<sup>14</sup>

## Conclusion

An umbilical cord infection may be clinically obvious, but also sometimes hidden. Breast milk is free, readily available and is sterile; mother’s can use breast milk topically to protect infants from umbilical cord infection. It helps in shorter cord separation time and reduces the rate of infection.

## Acknowledgement

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**Table 1: Frequency and percentage distribution of samples according to their selected demographic variables. N = 60**

| S. No | Variables    | Frequency | Percentage |
|-------|--------------|-----------|------------|
| 1.    | Age in years |           |            |
|       | • $\leq$ 20  | 12        | 20.00      |
|       | • 21-25      | 22        | 36.70      |
|       | • 26-30      | 20        | 33.30      |
|       | • $\geq$ 31  | 06        | 10.00      |
| 2.    | Religion     | 38        | 63.30      |

|     |  |    |       |
|-----|--|----|-------|
| 3.  | • Hindu                                      | 07 | 11.70 |
|     | • Christians                                 | 15 | 25.00 |
|     | • Muslim                                     |    |       |
| 4.  | <b>Educational status</b>                    | 08 | 13.30 |
|     | • No formal education                        | 23 | 38.30 |
|     | • Primary school                             | 26 | 43.30 |
|     | • High school                                | 03 | 05.00 |
|     | • PUC/ Diploma                               |    |       |
| 5.  | <b>Occupation</b>                            | 40 | 66.70 |
|     | • Home maker                                 | 12 | 20.00 |
|     | • Unskilled worker                           | 07 | 11.70 |
|     | • Skilled worker                             | 01 | 01.79 |
|     | • Health professionals                       |    |       |
| 6.  | <b>Monthly income of the family (Rs)</b>     | 34 | 56.70 |
|     | • ≤ 2500                                     | 23 | 38.30 |
|     | • 2501-5000                                  | 03 | 05.00 |
| 7.  | <b>Type of family</b>                        | 29 | 48.30 |
|     | • Nuclear                                    | 25 | 41.70 |
|     | • Joint                                      | 06 | 10.00 |
| 8.  | <b>Parity</b>                                | 18 | 30.00 |
|     | • Primi                                      | 42 | 70.00 |
|     | • Multi                                      |    |       |
| 9.  | <b>Birth weight of the baby (Kg)</b>         | 15 | 25.00 |
|     | • < 2.5                                      | 37 | 61.70 |
|     | • 2.5-3.5                                    | 08 | 13.30 |
| 10. | <b>Gestational age at delivery</b>           |    | 06.70 |
|     | • < 38 weeks                                 | 04 | 83.30 |
|     | • 38-40 weeks                                | 53 | 05.00 |
|     | • <40 weeks                                  | 03 |       |
|     | <b>Type of delivery</b>                      | 24 | 40.00 |
|     | • Normal vaginal delivery and posted for PPS | 36 | 60.00 |
|     | • LSCS                                       |    |       |

Table 2: Summary of day wise assessment of the group I for cord separation time and signs of infection. N = 30

| Day   | Mean  | Standard Deviation | Median | Mean (%) | Degree of Healing |
|-------|-------|--------------------|--------|----------|-------------------|
| Day 2 | 14.13 | 0.346              | 14.00  | 70.67    | Good              |
| Day 3 | 17.50 | 0.960              | 18.00  | 87.50    | Healthy           |
| Day 4 | 19.20 | 0.997              | 20.00  | 96.00    | Healthy           |
| Day 5 | 20.00 | 0.000              | 20.00  | 100.0    | Healthy           |
| Day 6 | 20.00 | 0.000              | 20.00  | 100.0    | Healthy           |
| Day 7 | 20.00 | 0.000              | 20.00  | 100.0    | Healthy           |

Table 3: 2 Summary of day wise assessment of the group II for cord separation time and signs of infection. N = 30

| Day   | Mean  | Standard Deviation | Median | Mean (%) | Degree of Healing |
|-------|-------|--------------------|--------|----------|-------------------|
| Day 2 | 12.00 | 0.830              | 12.00  | 60.00    | Moderate          |
| Day 3 | 13.77 | 0.504              | 14.00  | 68.83    | Good              |
| Day 4 | 15.07 | 0.365              | 15.00  | 75.33    | Good              |
| Day 5 | 16.70 | 0.535              | 17.00  | 83.50    | Good              |
| Day 6 | 18.17 | 0.648              | 18.00  | 90.83    | Healthy           |
| Day 7 | 18.60 | 0.932              | 18.00  | 93.00    | Healthy           |

Table 4: Effectiveness of two modalities within the groups for cord separation time and signs of infection. N= 60

| Groups  | Days  | Mean  | Standard deviation | Mean (%) | ANOVA (F value) |
|---------|-------|-------|--------------------|----------|-----------------|
| Group I | Day 2 | 14.13 | 0.346              | 70.67    | 607.501         |
|         | Day 3 | 17.50 | 0.960              | 87.50    |                 |
|         | Day 4 | 19.20 | 0.997              | 96.00    |                 |
|         | Day 5 | 20.00 | 0.000              | 100.0    |                 |
|         | Day 6 | 20.00 | 0.000              | 100.0    |                 |

|          |       |       |       |       |         |
|----------|-------|-------|-------|-------|---------|
| Group II | Day 7 | 20.00 | 0.000 | 100.0 | 522.183 |
|          | Day 2 | 12.00 | 0.830 | 60.00 |         |
|          | Day 3 | 13.77 | 0.504 | 68.83 |         |
|          | Day 4 | 15.07 | 0.365 | 75.33 |         |
|          | Day 5 | 16.70 | 0.535 | 83.50 |         |
|          | Day 6 | 18.17 | 0.648 | 90.83 |         |
|          | Day 7 | 18.60 | 0.932 | 93.00 |         |

df 5, 145, table value 2.28

**Table 5: Effectiveness of two modalities of treatment between the groups for cord separation time and signs of infection N = 60**

| Days  | Groups  | Mean  | Standard deviation | Mean% | t value |
|-------|---------|-------|--------------------|-------|---------|
| Day 2 | Group 1 | 14.13 | 0.346              | 70.67 | 12.990  |
|       | Group 2 | 12.00 | 0.830              | 60.00 |         |
| Day 3 | Group 1 | 17.50 | 0.960              | 87.50 | 16.845  |
|       | Group 2 | 13.77 | 0.504              | 68.83 |         |
| Day 4 | Group 1 | 19.20 | 0.997              | 96.00 | 21.331  |
|       | Group 2 | 15.07 | 0.365              | 75.33 |         |
| Day 5 | Group 1 | 20.00 | 0.000              | 100.0 | 33.786  |
|       | Group 2 | 16.70 | 0.535              | 83.50 |         |
| Day 6 | Group 1 | 20.00 | 0.000              | 100.0 | 15.503  |
|       | Group 2 | 18.17 | 0.648              | 90.83 |         |
| Day 7 | Group 1 | 20.00 | 0.000              | 100.0 | 8.226   |
|       | Group 2 | 18.60 | 0.932              | 93.00 |         |

df 58, table value 1.67

**Table 6: Comparison of cord separation time between two groups. N= 60**

| Day of separation of umbilical cord stump | Group 1   |            | Group 2   |            |
|---|-----------|------------|-----------|------------|
|   | Frequency | Percentage | Frequency | Percentage |
| Day 3                                     | 09        | 30.00      | 0         | 0.000      |
| Day 4                                     | 14        | 46.67      | 0         | 0.000      |
| Day 5                                     | 07        | 23.33      | 0         | 0.000      |
| Day 6                                     | 0         | 0.000      | 03        | 10.00      |
| Day 7                                     | 0         | 0.000      | 06        | 20.00      |
| Day >7                                    | 0         | 0.000      | 21        | 70.00      |

**Table 7: Chi square values showing association between topical application of breast milk and selected demographic characteristics**

| S. No | Sample Characteristics                   | ≤ Median | >Median | Chi square | Level of significance |
|-------|--|----------|---------|------------|-----------------------|
| 1.    | <b>Age in years</b>                      |          |         | 0.012      | NS                    |
|       | • ≤ 25                                   | 15       | 03      |            |                       |
|       | • Above 25                               | 11       | 01      |            |                       |
| 2.    | <b>Religion</b>                          |          |         | 0.141      | NS                    |
|       | • Hindu                                  | 15       | 04      |            |                       |
|       | • Christian & Muslim                     | 11       | 00      |            |                       |
| 3.    | <b>Educational status</b>                |          |         | 0.156      | NS                    |
|       | • Above primary                          | 13       | 01      |            |                       |
|       | • Primary & below                        | 13       | 03      |            |                       |
| 4.    | <b>Occupation</b>                        |          |         | 0.000      | NS                    |
|       | • Home maker                             | 16       | 03      |            |                       |
|       | • Others                                 | 10       | 01      |            |                       |
| 5.    | <b>Monthly income of the family (Rs)</b> |          |         | 0.000      | NS                    |
|       | • ≤ 2500                                 | 16       | 03      |            |                       |
|       | • Above 2501                             | 10       | 01      |            |                       |
| 6.    | <b>Type of family</b>                    |          |         | 0.156      | NS                    |
|       | • Nuclear                                | 13       | 03      |            |                       |

|     |   |                        |    |    |       |    |
|-----|---|------------------------|----|----|-------|----|
| 7.  | Parity                                  | • Joint & extended     | 13 | 01 | 0.323 | NS |
|     |   | • Primi                | 07 | 00 |       |    |
| 8.  | Birth weight of the baby(Kg)            | • Multi                | 19 | 04 | 0.000 | NS |
|     |   | • ≤ 2.5                | 07 | 01 |       |    |
| 9.  | Gestational age at the time of delivery | • Above 2.5            | 19 | 03 | 0.747 | NS |
|     |   | • ≤ 38 weeks           | 02 | 00 |       |    |
| 10. | Type of delivery                        | • Above 38 weeks       | 24 | 04 | 0.066 | NS |
|     |   | • NVD & posted for PPS | 12 | 04 |       |    |
|     |   | • LSCS                 | 14 | 00 |       |    |

df 1, table value 3.84 NS- not significant

**Table 8: Chi square values showing association between natural drying and selected demographic characteristics**

| S. No | Sample Characteristics                  | ≤ Median               | >Median | Chi square | Level of significance |             |
|-------|---|------------------------|---------|------------|-----------------------|-------------|
| 1.    | Age in years                            | • ≤ 25                 | 12      | 04         | 0.419                 | NS          |
|       |   | • Above 25             | 08      | 06         |                       |             |
| 2.    | Religion                                | • Hindu                | 12      | 07         | 0.018                 | NS          |
|       |   | • Christian & Muslim   | 08      | 03         |                       |             |
| 3.    | Educational status                      | • Above primary        | 08      | 07         | 1.350                 | NS          |
|       |   | • Primary & below      | 12      | 03         |                       |             |
| 4.    | Occupation                              | • Home maker           | 15      | 06         | 0.179                 | NS          |
|       |   | • Others               | 05      | 04         |                       |             |
| 5.    | Monthly income of the family (Rs)       | • ≤ 2500               | 09      | 06         | 0.150                 | NS          |
|       |   | • Above 2501           | 11      | 04         |                       |             |
| 6.    | Type of family                          | • Nuclear              | 06      | 07         | 2.868                 | NS          |
|       |   | • Joint & extended     | 14      | 03         |                       |             |
| 7.    | Parity                                  | • Primi                | 08      | 03         | 0.018                 | NS          |
|       |   | • Multi                | 12      | 07         |                       |             |
| 8.    | Birth weight of the baby(Kg)            | • ≤ 2.5                | 04      | 03         | 0.023                 | NS          |
|       |   | • Above 2.5            | 16      | 07         |                       |             |
| 9.    | Gestational age at the time of delivery | • ≤ 38 weeks           | 01      | 01         | 0.000                 | NS          |
|       |   | • Above 38 weeks       | 19      | 09         |                       |             |
| 10.   | Type of delivery                        | • NVD & posted for PPS | 02      | 06         | 6.158                 | Significant |
|       |   | • LSCS                 | 18      | 04         |                       |             |

df 1, table value 3.84 NS- not significant

**Conflict of Interest:** None.

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