

# NON-NUTRITIONAL USE OF BREAST MILK FOR UMBILICAL CORD STUMP CARE: A CASE REPORT

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**A** – study design, **B** – data collection, **C** – statistical analysis, **D** – interpretation of data, **E** – manuscript preparation, **F** – literature review, **G** – sourcing of funding

## ABSTRACT

**Background:** Human milk, in addition to nutrients, contains many biologically active substances including immunoglobulins, growth factors, cytokines, and a diverse population of somatic cells. Breast milk involves no risk of allergy, contains antibodies, and contains factors such as epidermal growth factor (EGF) and erythropoietin, which may promote the growth and repair of skin cells. The discovery of stem cells and the HAMLET complex in breast milk has led to increased interest in human milk as a natural medicine.

**Aim of the study:** The aim of the study was to identify the effect of topical application of breast milk on the separation time of the umbilical cord stump in newborns.

**Case report:** This paper presents the case of a patient who decided to treat her child's umbilical cord stump with colostrum/breast milk because her two older children had experienced long umbilical stump separation times. As a result of this treatment, separation of the stump occurred 90 hours after labor. There were no abnormalities in the construction of the navel, complications, or separation disorders of the umbilical cord stump.

**Conclusions:** This research demonstrates that colostrum/mother's milk was used as an easy, cheap, effective, and natural method of umbilical cord care.

**KEYWORDS:** breast milk, colostrum, umbilical cord care, separation time, milk therapy

## BACKGROUND

Human milk is considered to be the gold standard in infant nutrition, providing optimal nutrients for normal growth and development. However, since ancient times, breast milk was used as a combination of good nutrition and medication for diseased infants [1]. Human milk contains multiple bioactive and immunomodulatory compounds, as well as cellular components such as leukocytes, epithelial, progenitor, and stem cells, as well as commensal and beneficial bacteria [2]. The discovery of stem cells, the HAMLET (human alpha-lactalbumin made lethal to tumor cells) complex, and probiotic bacteria in human milk has resulted in renewed interest in human breast milk as a natural medicine. Recently, a few studies have been published on the non-nutritional, topical anti-inflammatory effects of human milk for severe eye dryness and eye lesions, sore nipples, and as an atopic eczema treatment [3]. A study by

Allam et al. showed that the mean umbilical cord separation time in a group that used breast milk as topical navel treatment was significantly shorter ( $p < 0.001$ ) than in a dry cord care group [4].

It is important to provide proper care for the portion of the cord that remains attached to a newborn's navel until it heals and separates from the umbilicus, which usually occurs within two weeks after birth. The remnant umbilical cord stump and the area surrounding the navel provides a route of access for bacteria to enter a newborn's body, which creates the risk for navel infection and sepsis. To avoid these undesirable effects, studies have long attempted to determine methods of umbilical stump care that are the most efficient. The World Health Organization (WHO) advocates the use of clean, dry umbilical cord care in high-resource settings but since 1998, the WHO has also pointed to research on the use of colostrum/breast milk in the care of the umbilical cord [5,6].

## AIM OF THE STUDY

This report presents the case of a patient who decided to treat the umbilical cord stump of her newborn using her breast milk, as her two older children had experienced long umbilical stump separation times.

## CASE PRESENTATION

The study was conducted with the approval of the Second Local Ethics Committee at the Medical University of Warsaw (KB/239/2016). Written information about the study was added to the patient's medical records. The patient retained the right to withdraw from the procedure for medically justified reasons. The patient participated in a detailed interview that was conducted to obtain information on her current state of health, any presence of chronic diseases, medication use, lifestyle, diet, pregnancy history, and number of childbirths. An umbilical stump care chart was prepared for treating the umbilical stump of her newborn with the patient's own colostrum/breast milk. The subject was a 29-year-old Polish woman in her fourth pregnancy and third childbirth. She suffered from insulin-dependent gestational diabetes mellitus (GDMG2) and was closely monitored by a diabetic clinic. Her glucose values throughout the pregnancy remained within normal ranges after long-acting overnight insulin doses. The pregnancy proceeded without complications. The interview indicated that her first child's umbilical cord stump had separated 25 days after parturition. For this child, octenisept liquid (octenidinum dihydrochloridum 0.1%, phenoxyetanolum 2%) had been used in umbilical care for the first 20 days. The child had jaundice and was treated with phototherapy. The newborn left the hospital on the tenth day after birth. With the second child, the umbilical cord separated on day 18 after birth. Octenisept liquid was also used for this child.

This study was conducted on a healthy female newborn with a birth weight of 3340 g, born through natural childbirth in week 39 of pregnancy. The infant scored 10 points on the Apgar scale at 1, 3, 5 and 10 minutes after birth. The umbilical cord was cut off and clamped with a sterile plastic clip at a distance of about 2.5 to 3 cm from the abdominal wall, after blood pulsation in the umbilical cord had stopped. The stump with the clip was not cleaned with disinfectant or a sterile swab. The infant was in skin-to-skin contact with the mother and was breastfed, on and off, for two-and-a-half hours. Colostrum was first applied to the umbilical cord in the third postpartum hour. The mother had a full body bath, including her breasts. Immediately before the milk was applied, she washed her hands to ensure they were clean and hygienic. The mother applied a few drops of colostrum directly from her breast to the umbilical stump: on its top at the intersection above the clip, along its entire length, width, and on the base at the abdominal wall, spreading the colostrum with her fingers. Three hours after birth, the umbilical stump was photographed (Fig. 1). Colostrum

was next applied eight hours after the first application, and was reapplied every eight hours over the next few days. Each time, the mother washed her hands, wiped mucus secretions from the umbilical stump using a sterile dry swab, and washed the stump using the expressed colostrum with sterile gauze. She then wiped the stump again with sterile gauze and applied a few drops of milk directly from her breast to the entire stump and its base, leaving it on for a few minutes to dry. The milk was spread gently with sterile gauze. During the entire procedure, the disposable diaper was tucked away so as to not cover the stump. The infant was not bathed in water before the stump separated and was instead cleaned using water-soaked cosmetic cotton swabs and sterile gauze.

During the first day after birth, a reduction in stump volume and a change in its color from white to milky-yellow were observed, and an odorless mucus secretion was seen at the base of the cord. On the second day, the umbilical cord's diameter had markedly reduced; there was also a noticeable change in the color and consistency of the Wharton's jelly and the cord blood vessels. Much less mucus was secreted compared to the previous day. There were no signs of inflammation.

Seventy hours after birth, the umbilical stump had turned completely black along its entire length. No mucus secretion around the navel was observed. The stump did not show signs of inflammation. C-reactive protein (CRP) levels were 11.01 mg/L (the reference range for an infant that is up to 1 month old is 0.00 – 6.00 mg/L) (Fig. 1).

We determined the nutrient content of the breast milk in terms of fat, crude protein, carbohydrates, and energy. The mother's milk sample was collected in sterile tubes on the third postpartum day, unpasteurized, pooled, and frozen at -20°C. The sample was analyzed in triplicate. The analysis was performed using a human milk analyzer (MIRIS AB), following the manufacturer's recommendations. This device is an analytical instrument used to determine the nutritional content of human milk through mid-infrared transmission spectroscopy. On the third day after delivery, the nutrient contents of the milk were: 1.5 g/dL protein (SD 0.08), 5.4 g/dL fat (SD 0.1), 6.8 g/dL carbohydrates, and 64 kcal/dL energy (SD 1.2).

The umbilical stump was separated 90 hours after birth (the fourth day). There were no abnormalities, complications, or disorders related to the separation. A few hours after separation, only slight bleeding from the navel could be observed, which persisted for seven days, though decreasing each day. The navel has a normal anatomical structure. During the entire care procedure, the umbilical stump was never soiled with urine or feces, and so there was no need to wash it with soap and water. The CRP value on the 5th day after birth was 4.39 mg/L.

The newborn had jaundice beginning on day 2 postpartum, with the highest concentration of total bilirubin (15.76 mg/dL) on day 3. Phototherapy was started on the fourth day after birth (after 78 hours). The mother



Figure 1. Photographs of the umbilical cord stump: A – 3 hours post birth; B – 20 hours post birth; C – 40 hours post birth; D – 70 hours post birth; E – 96 hours post birth.

and child were discharged from hospital on day 5 after delivery, at which point the total bilirubin concentration was 13.59 mg/dL.

## DISCUSSION

According to scientific literature, the time for umbilical cord separation ranges from 4 to 16 days depending on the intervention and study setting [7]. Before full separation, the umbilical cord stump can be considered a healing wound, and thus poses to be a possible route of infection. Hence, shortening the time to separation is important in preventing infections in the

neonatal period, and reduces the probability of omphalitis, systemic infection, and sepsis [3]. The nature of optimal umbilical cord care is controversial, but the method of care employed undoubtedly affects the time to cord separation.

In this study, topical application of breast milk as an umbilical cord stump care method led to a much shorter umbilical cord stump separation time compared to the separation times of the woman's previous children, whose stumps separated in weeks 3 and 4 after birth. In addition, the mother did not report any difficulties associated with the use of this cord care method. These conclusions agree with the results

of a study by Allam et al., who tested mothers' satisfaction in using human milk to care for umbilical stumps. The vast majority of women were very satisfied with the effects of the methods used and the ease of care [4]. This is a very important aspect, as newborn navel care can be a problem for many parents.

Umbilical cord separation is a complex process. The cord dries and becomes mummified, and histological study has shown that polymorphonuclear leukocytes infiltrate the area between the drying cord stump and vital tissues of the abdominal wall, forming a demarcation zone. Human milk contains many leukocytes, as well as immunological and anti-infective agents. Studies in the past decades have demonstrated that human milk is a potent immunocompetent agent containing a variety of rich components, each of which has a role in the immunologic protection of infants. Breast milk may enhance umbilical cord separation through the action of polymorphonuclear leukocytes, proteolytic enzymes, or other immunologic agents that act as natural antimicrobials. Abbaszadeh et al. compared the effects of topical human breast milk on umbilical cord separation time to the dry care recommended by the WHO, which involves application of chlorhexidine. The studies showed that the mean cord separation time in the human breast milk group was significantly shorter than the other groups [8]. Umbilical cord antiseptic practices remain somewhat controversial and variable, even in high-resource countries with relatively aseptic conditions at delivery.

Actions reducing exposure of the cord stump to symbiotic flora will increase separation time. It is suggested that intensified elimination of symbiotic bacteria through the use of antibacterial agents for the care of the umbilical cord results in a limited inflow of leukocytes to the separation area and impaired digestion of dead tissues. In our opinion, the specific composition of the fresh milk microbiota may also be important. Promoting colonization of the umbilical cord by nonpathogenic bacteria may prevent the development of neonatal omphalitis. Skin-to-skin contact with the mother, "room-in" systems, and the mother's milk can create an environment conducive to colonization by less pathogenic bacteria acquired from the mother's flora. This helps to reduce colonization and infection by potentially pathogenic organisms that are ubiquitous in the hospital environment.

How the stem and progenitor cells in breast milk affect navel nursing is unclear, but if stem cells are

used in regenerative medicine, they are unlikely to be irrelevant here. It is clear that factors other than the simple choice of cord care method might affect umbilical stump separation time. Clinical procedures for cord care are based on research from developed countries. Therefore, research findings from developed countries are difficult to apply in developing countries as they have significant differences in resource availability, social customs, environmental cleanliness, and bacteriological profile. In developing countries, there have been few randomized trials to investigate the impact of different cord care regimens, including use of mother's breast milk, on umbilical cord separation time. Our research is the first study from Poland, and from any developed country, to show that breast milk can be used for umbilical cord care. As a non-nutritional use of breast milk, this may be considered as an example of personalized medicine. Human milk is a natural agent that is biologically suitable for the body, has no side effects, is readily available, and can be used by people of all social and economic backgrounds; it can therefore be universally recommended as an effective agent for umbilical cord nursing. Further research, including studies in both developing and developed countries, is recommended to confirm our results on the positive effects of topical breast milk application in umbilical cord care. Treating the umbilical cord stump with human milk may also help convince mothers to continue to breastfeed with their own milk, as it is a substance that possesses extraordinary properties beyond nutrition. Gaining greater insight into human milk composition, including the multitude of immunologically active compounds that it contains, creates the prospect of using breast milk as a cheap and relatively easily available therapeutic agent for navel care. Further research is recommended to find and verify the benefits that we have reported in this study, as well as identify any potential risks associated with the use of breast milk for therapeutic purposes.

## CONCLUSIONS

The topical application of breast milk in umbilical cord care leads to a shorter cord separation time and can be used as cheap, effective, and natural method for umbilical cord care. The mother in this study was very satisfied with the effects of the methods used and the ease of care associated with the application of breast milk to the navel of her infant.

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