

Case report:**Can oral administration of colostrum increase the success of first breastfeeding in premature babies?****A study of four cases**Dilek Menekşe^{1*}, Özge Karakaya Suzan², Nursan Cinar³, İbrahim Caner⁴**Abstract**

Oral administration of colostrum in premature infants has become increasingly common in recent years. Evidence-based studies emphasize that oral administration of colostrum supports immune development in low-birth-weight infants and premature newborns, contributing to the oral microbiota development and reducing the length of stay in hospital. However, its effects on breastfeeding are still not clearly known. This study examines the effect of oral colostrum, which is administered from the first 24 hours of life to the first breast-feeding, on first breast-feeding in very low-birth-weight premature infants who cannot be fed orally. By examining a total of four cases, this study has shown that oral administration of colostrum can be used to increase the success of first breastfeeding. This practice may provide hope for medically vulnerable low-birth-weight infants, who cannot be fed orally, to benefit more from breast milk.

Keywords: oral colostrum; breastfeeding; breastfeeding success; nursing

Bangladesh Journal of Medical Science Vol. 21 No. 04 October '22 Page : 912-917
DOI: <https://doi.org/10.3329/bjms.v21i4.60239>

Introduction

One in every eight babies in the world is born prematurely, and 30% of those born with very low birth weight (<1500 g) develop lifelong adverse complications, affecting their neurological, gastrointestinal and/or respiratory systems.^{1,2} Despite the overwhelming evidence for the benefits of breast milk, and especially colostrum, for this vulnerable population, the rate of breastfeeding is pretty low for premature infants in the neonatal intensive care unit.²⁻⁵ Due to poor sucking/swallowing/respiratory coordination, premature babies cannot switch to enteral feeding immediately. These infants can benefit from several advantages of colostrum with oral administration unless breast milk is contraindicated.¹ There are several factors affecting breastfeeding.

Newborn's sensory experience of smell and taste until their first breastfeeding is one of the most important factors. Studies have shown that premature babies can distinguish their mother's milk odor and taste.⁶ Based on these results, this study examined the effect of intraoral administration of colostrum on the first breastfeeding success of premature newborns by using a total of four low-birth-weight premature babies.

Case Presentation**Descriptive characteristics of the cases**

The cases admitted to the neonatal intensive care unit just after delivery were between 30-32 gestational weeks and had very low birth weight (1001-1500gr). Table 1 presents their descriptive characteristics.

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Case selection criteria

A few case selection criteria were determined to standardize cases to whom oral colostrum was administered, using some characteristics (which may affect sucking in newborns positively or negatively). Cases with characteristics that may adversely affect sucking in newborns such as congenital anomaly (including craniofacial anomaly such as cleft palate, cleft lip, facial muscles paralysis), contraindication of breast milk, and gastrointestinal disease (such as necrotizing enterocolitis) were excluded from the study. No neurological problem that would prevent the newborn from smelling and tasting colostrum were identified for those included in the study. It was studied with newborns who were admitted to the tertiary neonatal intensive care unit immediately after birth.

Training on Oral Colostrum Administration Protocol

To ensure the continuity of colostrum administration by applying same procedures every three hours, nurses in the intensive care unit were trained on the subject (how and how often to store, prepare and administer the colostrum etc.).

Human Milk Collection and Storage

After the newborns were referred to the intensive care unit, their mothers were trained on how to express and store breast milk. The mothers were asked to collect the colostrum by hand every two hours and bring it to the clinic within two hours.

The application was carried out in accordance with the oral colostrum protocol (Table 2).

Oral administration of colostrum to premature infants according to the abovementioned protocol was started one day after their admission to the intensive care unit and was repeated every three hours until the first day of breastfeeding. The application was continued for a minimum of five days for each baby. No side effects or complications were observed during the application.

Breastfeeding Assessment Tool

The Bristol Breastfeeding Assessment Scale, which was developed by Jenny Ingram (2014) and adapted into Turkish by Dolgun et al. (2018), was used in the study.^{7,8} This is a 3-point

The scale consists of 4 items (positioning, holding, sucking and swallowing). Each item is scored between 0-2 points (0 poor, 1 moderate, 2 good).

The lowest and highest scores on the scale are 0 and 8, respectively. A high score indicates an effective breastfeeding or vice versa.

Evaluation of Breastfeeding

The success of first breastfeeding was evaluated simultaneously by two independent observers (the researcher and a breastfeeding nurse with training and certification in breastfeeding) using the scale separately. The mothers were invited to the first breastfeeding by informing them about the breastfeeding preparation procedures (such as no smoking, taking a shower, wearing appropriate clothes, etc.) one day before breastfeeding. When the mothers came to the clinic, they were trained on breastfeeding before they breastfeed their babies.

Ethical Considerations

For conducting this study, an ethics committee approval (dated 09.03.2020 and numbered 16214662/050.01.04/47) was obtained from the Non-Pharmaceutical Interventional Clinical Studies Ethics Committee at Sakarya University. The mothers were informed that their identities would be kept confidential, their names would not be published anywhere, and the study results would be reported only in the journal. Then their written and verbal consents were received.

Outcome

The effects of oral colostrum administered to very low birth weight premature babies, who were not fed orally and followed in the tertiary neonatal intensive care unit of a hospital in Sakarya, on breastfeeding are presented Table 1.

In this case report, newborns were hospitalized with different diagnoses such as prematurity and respiratory distress syndrome. They were born between 30-32 gestational weeks and their birth weight varied between 1370-1500 g. Oral colostrum protocol was applied to them for a minimum of 5 days and a maximum of 10 days. As a result of this application, the readiness indicators of the newborn sought for the transition to the first breastfeeding were noted by the nurse practitioners and evaluated with a scale measuring the success of breastfeeding. According to the nurses' notes, sucking and swallowing reflexes of the premature infants generally developed during the preparation stage for breastfeeding, and their scores for the first breastfeeding varied between 4 and 6.

Discussion and Conclusion

Premature babies frequently have oral feeding

Table 1: Patient demographics and effect of oral colostrum on neonatal outcomes

Cases	Sex/ gestational week	Medical diagnosis	Physiological measurements	Anthropometric measurements	Enteral feeding day/ type of feeding	Oral colostrum administration day	First breastfeeding day	Breastfeeding success	Nurse observation
Case 1	Female / 32GW	Premature	Pulse: 153/ minRespiratory rate: 58 /min, SpO2:%99 Body temperature: 36.5 °C	Birth weight: 1500grheight 42cm, 30cm head circumference 6th day: 1320gr	1st day / breast milk with orogastric tube	5thday	6thday	<p>Bristol Breastfeeding Assessment Tool</p> <p>1. Observer: 6</p> <p>Positioning:1 (moderate) Grasping/ Attachment: 2 (good) Sucking: 2 (good) Swallowing/ Gulping:1 (moderate)</p> <p>2. Observer:6 Positioning:1 (moderate) Grasping/ Attachment: 2 (good) Sucking: 2 (good) Swallowing/ Gulping:1 (moderate)</p>	<p>3rd day of the application "the baby has a sucking and swallowing reflex during oral administration of colostrum"</p> <p>5th day of the application "the baby has a sucking reflex, her vital signs are stable after the colostrum administration, and her clinical condition improves"</p> <p>Evaluation of the first breastfeeding "the baby's sucking is effective and regular and her swallowing can be heard".</p>
Case 2	Male /32GW	Premature, LBW * AB with EMR **	Pulse:124/min Respiratory rate: 56 /min, SpO2:%99 Body temperature: 36.2°C	Birth weight: 1480gr, height 40cm, 29cm head circumference 6th day: 1510gr	1st day / breast milk with orogastric tube	5thday	6thday	<p>Bristol Breastfeeding Assessment Tool</p> <p>1. Observer: 5 Positioning:0 (Poor) Grasping/ Attachment: 1 (moderate) Sucking: 2 (good) Swallowing/ Gulping:2 (good)</p> <p>2. Observer: 4 Positioning:0 (Poor) Grasping/ Attachment: 1 (moderate) Sucking: 2 (good) Swallowing/ Gulping:1 (moderate)</p>	<p>3rd day of the application "sucking movements are observed in the baby after oral administration of colostrum, and he calmed down"</p>
Case 3	Female /30GW	Premature	Pulse: 140/min Respiratory rate: 62 /min SpO2:%97 Body temperature: 36.2°C	Birth weight: 1370gr, height 39cm, 29cm head circumference 11th day: 1520gr	2nd day / breast milk with orogastric tube	10thday	11thday	<p>Bristol Breastfeeding Assessment Tool</p> <p>1. Observer: 5 Positioning:0 (Poor) Grasping/ Attachment: 1 (moderate) Sucking: 2 (good) Swallowing/Gulping: 2 (good)</p> <p>2. Observer: 5 Positioning:0 (Poor) Grasping/ Attachment: 1 (moderate) Sucking: 2 (good) Swallowing/Gulping: 2 (good)</p>	<p>9th day of the application "both sucking and swallowing are present in the baby" on the</p>

Cases	Sex/ gestational week	Medical diagnosis	Physiological measurements	Anthropometric measurements	Enteral feeding day/ type of feeding	Oral colostrum administration day	First breastfeeding day	Breastfeeding success	Nurse observation
Case 4	Male /31GW	Premature, RDS***	Pulse: 132/min, Respiratory rate: 52/min SpO2:%98 Body temperature: 36.1°C	Birth weight: 1500gr, height 40cm, 28cm head circumference 9th day: 1600gr	1st day / breast milk with orogastric tube	8thday	9th day	<p>Bristol Breastfeeding Assessment Tool</p> <p>1. Observer: 4</p> <p>Positioning:0 (Poor) Grasping/ Attachment: 1 (moderate) Sucking: 1 (moderate) Swallowing/Gulping: 2 (good)</p> <p>2. Observer: 5</p> <p>Positioning:0 (Poor) Grasping/ Attachment: 1 (moderate) Sucking: 2(good) Swallowing/Gulping: 2 (good)</p>	7th day of the application "sucking is active, and swallowing is present"

*LBW: Low Birth Weight, **AB with EMR: Premature Membrane Rupture, ***RDS: Respiratory Distress Syndrome

Table 2: Oral colostrum administration protocol^{12,14-16}

- The colostrum expressed by the mother into a breast milk storage bag was received and labeled.
- The total amount of colostrum brought by the mother was recorded daily using an intraoral colostrum follow-up form.
- The identity of the mother from whom the colostrum was received was confirmed to match with the identity of her baby.
- The colostrum was stored in the refrigerator at -18 °C.
- The total amount (ml) to be used daily was kept on the shelf of the refrigerator (0-4°C).
- A total of 0.2 ml of colostrum was inserted inside the baby's cheeks and tongue.
- During the administration, the colostrum was drawn into a syringe considering the baby's weight and left at room temperature for 5 minutes.
- The practitioner washed hands and wore gloves during the application.
- The colostrum was rubbed into the baby's both cheeks along the tongue surface, starting from the tip of the tongue.
- The procedure was repeated every 3 hours.
- In cases of the deviations from normal values in the baby's vital signs including a) SPO₂ <85 b) Pulse <100/minutes c) Pulse >200/minutes, d) Respiratory rate >80/minutes, the administration was immediately terminated.

difficulties due to structural deficiencies in sucking, swallowing and respiratory coordination, short gestation length, immaturity, and weak suction pads on the chin. One of the major challenges in these infants is the difficulty in establishing sucking-feeding competence.¹ Sucking, swallowing and respiratory coordination is matured at the 34th week of gestation. In our study, oral administration of colostrum was applied to four newborns (Case 1 - 32GW, Case 2 - 32GW, Case 3 - 30G, and Case 4 - 31GW). They started breastfeeding at their corrected age as follows: Case 1 - 32+6 weeks, Case 2 - 32+6 weeks, Case 3 - 31+4 weeks, and Case 4 - 32+2 weeks. The main point where we evaluated the effect of the application in the study is the success of the first breastfeeding. A breastfeeding training was given to the mothers before breastfeeding in order to make them keep their babies in similar positions during breastfeeding and to observe the baby's behaviors on the mother's breast. The other three items evaluate the baby's behaviors of "holding", "sucking" and "swallowing" the mother's breast.

In the study, one of the cases (case 1: 2 points) got full points for having a search reflex, opening the mouth wide and taking the breast tissue into the mouth, while others (Cases 2-3-4: 1 point) met only some criteria for holding and grasping the breast. As the chemical structure and smell of amniotic fluid are similar to that of oils secreted from Montgomery glands in the mother's breast.^{9,10} it is considered that the continuation of these senses, which the cases are familiar with during the fetal period, with colostrum administration in the period when oral feeding cannot be achieved, positively affects their success in finding, holding and grasping the breast.

The observers determined that Cases 1, 2, 3 (2 points for each) had an effective sucking cycle in both breasts, and Case 4 (1 point) could not hold and suck the breast steadily (Table 1). Studies have reported that both smell and taste of breast milk activates trigeminal and facial motor nerves in the brain stem of newborns, increasing their sucking movements and allowing them to switch to oral feeding early.^{6,11} In our cases, colostrum administration increased oral stimulation, improved feeding skills, and therefore positively affected breastfeeding.

Three cases (Cases 2, 3, 4) had regular audible

and silent swallowing, and one case (Case 1) had occasional swallowing and mouth smacking movements. Considering min:0 and max:8 scores on the scale; it is quite good for all cases to obtain 4 and above in the first breastfeeding assessment. The results raise the question of "Does oral administration of colostrum increase breastfeeding success by stimulating the senses of smell and taste in newborns?". Randomized controlled studies with a high level of evidence are needed to better answer this question. In our study, these four cases were discussed to draw attention to this issue.

Evidence for the benefits of oral colostrum protocol for newborns continues to increase and gain importance in the growing literature.^{2,4,5,12,13} The results of our study suggesting both appropriate weight gain in line with birth weeks and absence of NEC, Sepsis, intracranial hemorrhage and pneumonia symptoms in four cases are supported by those in the literature. As one of the strengths of oral colostrum administration, this study emphasizes the promotion of frequent supply and maintenance of colostrum. Oral administration of colostrum is also part of the recovery, growth and development of premature babies to get more out of colostrum. In conclusion, we consider that this application is effective in the transition of premature infants to breastfeeding. It is important to conduct randomized controlled evidence-based studies that will further clarify the results of this case study.

Conflict of interest: The authors declared that there are no conflicts of interest.

Ethical clearance: Sakarya University Non-Pharmaceutical Interventional Clinical Studies Ethics Committee (Date: 09.03.2020, Number: 16214662/050.01.04/47)

Funding: None

Authors' contribution:

Conception and idea owner of this study: DM, NC

Study design: DM, OKS, NC

Data gathering: DM, OKS, IC

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Editing and approval of final draft: DM, OKS, NC, IC

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