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Modern methods of breast feeding maintenance in children with intestinal colics.

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The issue of long-term breast feeding maintenance is relevant for medical communities of many countries of the world. Long-term breast feeding is especially important in premature children and children born with a perinatal pathology. According to scientific literature, the main reasons of breast feeding termination/reduction and early transfer of children to milk formula feeding include impossibility of breast feeding due to condition severity, prematurity, mother's milk supply failure and, therefore, various functional digestive disorders (aerophagias, regurgitations, flatulence, colics). It is important to ensure proper latching of the baby to the breast, as it is conducive of effective sucking, and recover complete breast feeding in the event of temporary supplementary and mixed feeding. The article presents results of a trial conducted at the FSBI Scientific Center of Children's Health. Use of special medical products (nipples, phials) developed on the basis of thorough study of maternal breast sucking physiology in the breast feeding termination risk group children (n = 33) allows maintaining children's need in breast feeding and promotes effective breast feeding recovery.

Key words: breast feeding, aerophagia, neonates, premature children, causes of weaning, special medical products (phials, nipples).

Medical communities of the developed countries are concerned about reduction in breast feeding spread and duration.

Breast milk is a unique natural perfectly-balanced food product for all infants. The work on maintaining successful breast feeding is based on the results of numerous trials proving that mother's milk is live tissue almost identical to the neonate's tissues in composition [1, 2].

Breast feeding advantages are as follows [3]:

- Optimal breast milk composition satisfying children's dietary needs to the maximum extent;
- High assimilability of proteins, fats, carbohydrates and minerals in the event of breast feeding;
- Breast milk enzymes, hormones, bioactive agents and immune factors (cells) responsible for anti-infective, anti-viral and antibacterial protection of the child's body;
- Provision of psychological and physiological contact of mothers with their children;
- Physiological colonization of a neonate's intestinal microflora;
- Economic-temporal advantage: breast milk is completely free and does not take time to be prepared.

The most important issue is to maintain long-term breast feeding in the children born with various health disorders, especially in premature patients. Numerous trials have proven that breast feeding reduces infectious morbidity rate (considerably) [4-6], risk of necrotizing enterocolitis development [4, 7], late septicemia [4, 6] and hospital stay duration [6] and improves food tolerance [8, 9] and neurological outcomes [10-14] in premature infants, including extremely low birth weight infants.

Results of polling 873 parents living in Europe (57%), Asia (17%), America (17%), Africa (6%) and Oceania (3%) were presented at “The Global Breastfeeding Initiative” summit in Madrid, 2012. At the moment of form filling, children of 74% of respondents (n = 563) were receiving breast feeding. The poll involving 2,266 health professionals (including 100 Russian respondents) revealed that one of the reasons of breast feeding withdrawal is breast refusal. The average score of option “The child does not want to be breastfed” given in the form as one of the refusal reasons (from 0 (no problems) to 5 (very frequent problem)) was 1.3 (according to 1,798 health professionals).

Breast refusal may be caused by sucking reflex weakness due to immaturity/prematurity, pathology of the mother mammary gland’s nipples (inverted, flat), pain syndrome due to aerophagia, flatulence or colics in case of abnormal nipple latch and impaired breast sucking mechanism. These causes are often concurrent.

Efficient breast sucking required correct sequence of the 3 actions done by a neonate’s oropharynx: latch, peristaltic motions and swallowing.

Latch is a stage when a baby protrudes lips and grasps a mammary gland’s nipple with them. The nipple ought to be held tightly in the mouth cavity. Good breast nipple latch by a child is a proof of his/her maturity and health. Previously, mammary gland’s nipple latch mechanisms were studied insufficiently. A trial conducted by the Pigeon scientists (Japan) revealed high importance of children’s labial musculature for latching and sucking. The nipple latch mechanism stages are as follows: first, the child protrudes lips to latch the nipple, then the lips bear tightly against nipple areola so the milk does not leak. The tip of the tongue is motionless and pressed against the lower gum. The lips provide perfect contact with peripapillary surface (areola) by building negative pressure. In other words, infants make almost no effort to draw milk out of nipples. Such tight contact of lips with breast prevents milk leakage.

The next step is **peristaltic motions** – unique wave-like tongue motions the baby performs to draw milk out of breast. The tongue performs 800-1,000 motions per feeding. Adults are not capable of performing 800 tongue motions with such speed.

The last stage – **swallowing** – occurs when the back of the tongue rises to the palate in order for milk not to penetrate respiratory tracts, but to pass to the esophagus. The question whether children hold breath or continue breathing when swallowing remains open. There has been no definitive answer yet. However, the study of sucking mechanisms conducted by the Pigeon researchers revealed a significant difference between infants and adults concerning the swallowing process. Adults swallow with mouth shut, breath held. In infants, though, pharynx is located higher, so milk passes to the esophagus without impeding breathing. Thus, the food swallowing process in adults is cardinally different from swallowing in neonates.

Having studied and examined natural feeding mechanisms, we may understand mechanisms of breast feeding deviations, occurrence of digestive dysfunctions due to abnormal latch and breast sucking, breast milk deficiency or complete breast refusal.

Aerophagia (from Greek αεροφαγία) is a condition of excessive air swallowing and its subsequent regurgitation. Aerophagia often develops in children of several months of age, especially in premature infants, due to weakness or immaturity of regulation processes and, therefore, difficulties with breast latching and swallowing. Aerophagia is observed in children with perinatal pathology, total muscular hypotonia or, vice versa, in greedily sucking children characterized by hyperexcitability [15].

Aerophagia symptoms in breastfed infants are as follows: cry at feeding, breast refusal, abdominal swelling, colics and regurgitations (after feeding). Mothers ought to be taught the breast feeding technique immediately after childbirth. A child ought to be held in vertical position for ca. 15 minutes after feeding, which is usually sufficient for the excessive air to go out.

A special group of children whom it is important to provide and maintain long-term breast feeding is the children born with health deviations, especially premature infants. At the same time, it is extremely difficult to provide adequate breast feeding to these children. Even latched

on, children with perinatal pathologies are often unable to latch the nipple properly, refuse breast, suffer from aerophagia, colics and regurgitation syndrome due to inefficient sucking mechanism. Auxiliary means are often required to overcome this difficult period of teaching a child (especially a child born ill) how to latch on and suck breast properly.

Modern technological capabilities and thorough long-term study of breast sucking and lactation mechanisms helped to develop and create a special nipple Pigeon Peristaltic PLUS having such shape and surface texture that optimal latch is ensured; it helps to reproduce physiological peristaltic component of natural sucking. Use of such a nipple bottle involves a possibility to return to breast feeding forcedly weaned children; thus, such nipple bottles help to ensure long-term natural feeding.

We conducted a surveillance non-comparative prospective trial of efficacy of using a bottle with nipple Pigeon Peristaltic PLUS for support, maintenance and return to breast feeding of neonates, including premature infants and temporarily/partly weaned children of several months of age, in consonance with the principle of staged developmental care of neonates with perinatal pathologies [16] at premature infants units and medical rehabilitation units for infants with perinatal pathologies of the Scientific Center of Children's Health (Federal State Budgetary Institution).

The trial involved 33 neonates and breastfed infants of 1-10 weeks of age without contraindications against inclusion in the trial, whose parents produced written consent to the trial. We included children with mild or moderate perinatal lesions of central nervous system, children with low birth weight and/or premature infants capable of sucking without assistance.

The trial involved 1 premature infant with birth weight less than 1,500 g; 4 infants with birth weight of 1,501-2,000 g; 7 infants with birth weight of 2,001-2,500 g and 1 premature infant (35-36 gestation weeks) with birth weight of 2,880 g.

The trial involved 9 (27.3%) children with mild or moderate perinatal lesion of central nervous system. Prolonged conjugated jaundice was observed in 6 (18.1%) patients. 5 (15.1%) children had intrauterine pneumonia; respiratory distress syndrome was observed in 5 (15.1%) patients; 1 (3%) child was diagnosed with bronchopulmonary dysplasia; lactase deficiency was detected in 6 (18.1%) patients.

Reasons of temporary weaning:

- 1) Supplementary feeding with expressed breast milk at sufficient lactation due to difficulties with latching on (flat or taut nipples, nipple fissures) – 5 (15.2%) patients;
- 2) Supplementary feeding with formula (up to 30% of the feeding) at insufficient lactation – 7 (21.2%) patients;
- 3) Lingering conjugated jaundice and feeding with expressed pasteurized breast milk – 4 (12.1%) patients;
- 4) Supplementary feeding with expressed breast milk in case correction of severe lactase deficiency with lactase preparations is required (the enzyme is introduced in the preliminarily expressed breast milk) – 4 (12.1%) patients;
- 5) Health improvement and readiness to suck without assistance (shift from tube feeding to bottle feeding) expressed breast milk, then – to latch on – 13 (39.4%) patients.

The duration of using the nipple bottle in question in children was 10-14 days at the average. We evaluated certain parameters characterizing sucking physiology quality (occurrence of aerophagia, colics) and readiness to suck breast. The evaluation was performed in the beginning, in the middle and in the end of the trial.

One of the most important results of the trial was aerophagia rate. Thus, in the beginning of the trial aerophagia was not present at all in 2 children (6.06%), extremely rare (2-3 times per day) in 14 children (42.42%), rare (5-6 times per day) in 11 children (33.33%) and frequent (once per hour) in 6 children (18.18%).

After 14 days aerophagia was not present at all in 7 children (21.21%), extremely rare in 24 children (72.73%), rare in 1 child (3.03%) and frequent in 1 child (3.03%).

Thus, aerophagia was observed in 31 children before the trial, whereas by the end of trial it persisted only in 26 children and was extremely rare in 24 children (72.7%) (pic. 1).

We also studied rate of colics: in the beginning of the trial they were not present at all in 1 child (3.03%), extremely rare (2-3 times per day) in 9 children (27.27%), rare in 14 children (42.42%), frequent (once per hour) in 7 children (21.21%) and very frequent in 2 children (6.06%).

After 14 days colics were not present at all in 14 children (42.42%), extremely rare (2-3 times per day) in 12 children (36.36%), rare in 6 children (18.18%), frequent (once per hour) in 0 children (0.00%) and very frequent in 1 child (3.03%).

Thus, colics were observed in 30 children in the beginning of the trial, whereas by the 14th day of trial they persisted in 19 children, were extremely rare in 12 children (36.3%) and frequent in 1 child only (pic. 2).

We studied the potential to return to breast feeding.

In the beginning of the trial 10 (30.30%) children refused breast; short sucking and anxiety were observed in 3 (9.09%) children. There were 6 (18.18%) patients sucking only 20-30% of the required amount before refusing feeding, 3 (9.09%) patients sucking ca. 50-60% of the required amount before refusing feeding and 11 (33.33%) patients sucking the required amount of breast milk out of the breast with ease.

After 14 days of the trial there were no children refusing breast; short sucking and anxiety were observed in 4 (12.12%) children. There were 3 (9.09%) and 10 (30.30%) patients sucking 20-30 and 50-60% of the required amount before refusing feeding, respectively, and 16 (48.48%) patients sucking the required amount of breast milk out of the breast with ease (pic. 3).

Thus, in the beginning of the trial there were 10 (30.30%) children refusing breast and none by the 14th day (0%); there were 14 (42.42%) children sucking up to 60% or 100% of the required amount of breast milk out of the breast in the beginning of the trial and 26 (78.78%) in the end; the number of children receiving primarily breast feeding almost doubled.

Thus, in order to maintain and increase spread of breast feeding among children with perinatal pathologies, including premature infants, it is necessary to:

- improve information awareness and education quality of the medical personnel in terms of breast feeding (lectures, seminars, professional retraining);
- theoretical educational programs for parents and breast feeding technique trainings for mothers;
- special medical devices (bottles, nipples) should be recommended for the weaning risk group children, e.g., Pigeon Peristaltic PLUS developed in the basis of infant sucking physiology trial results.

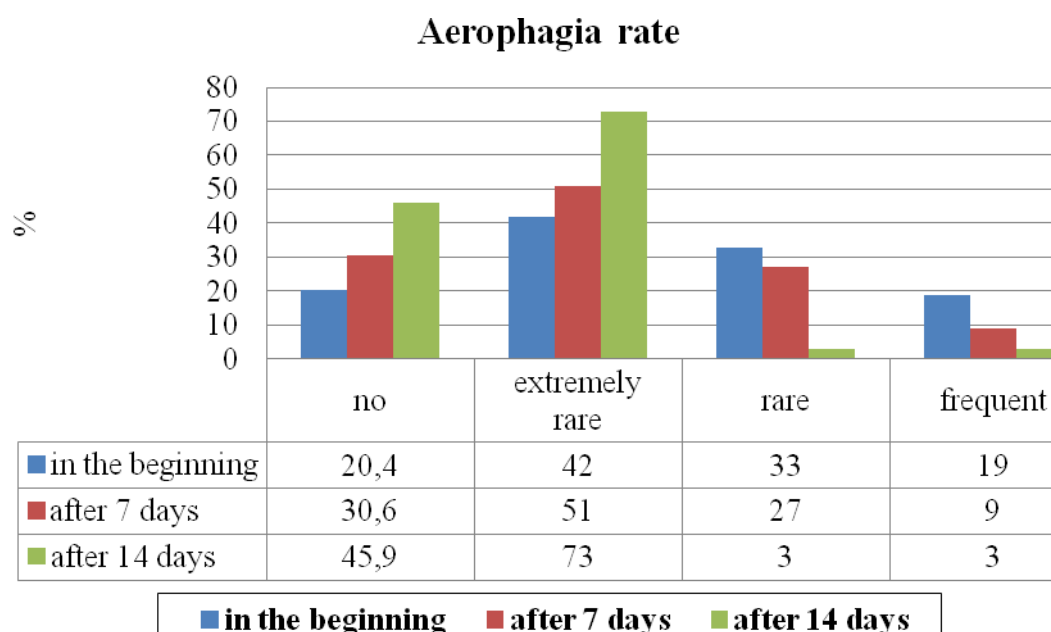
Use of these products considerably decreases the rate of functional digestive disorders (aerophagia, colics) and provides a real opportunity to completely shift or return to breast feeding.

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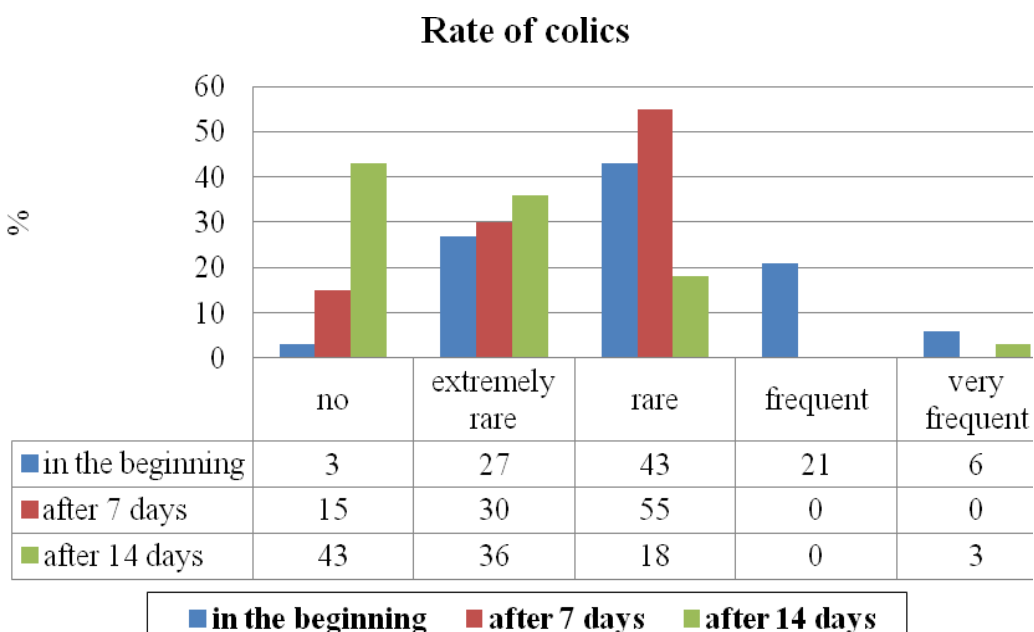
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Pic. 1 Aerophagia rate in the beginning, after 7 and 14 days of the trial



Pic. 2. Rate of colics in the beginning, after 7 and 14 days of the trial



Pic. 3. Children's capacity for breast feeding in the beginning, after 7 and 14 days of the trial

Potential to return to breast feeding

