

Breast milk banks – a special kind of banks

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Abstract

Breast milk is a unique mixture of substances essential for the early development of newborns and infants. The initiative to establish institutions collecting breast milk enables the administration of natural milk to premature or ill infants who cannot be fed with breast milk due to circumstances or medical considerations. Women donate their breast milk to these banks on a voluntary basis, in return receiving free breast milk testing, lactation consultant services, and health education. The collection procedure is performed with the utmost care, and each sample undergoes strict testing, allowing for its appropriate use.

Key words:

milk bank, breast milk,
milk, breastfeeding

Introduction

Breastfeeding is optimal both for the mother and for the baby. It is an inherent part of human life, as important as pregnancy and birth. The World Health Organization, UNICEF, the American Academy of Pediatrics, and the European Society for Pediatric Gastroenterology Hepatology and Nutrition

recommend that babies be exclusively breastfed until 6 months old. There is no set limit for the continuation of breastfeeding, which is assumed to be recommended for as long as both the mother and baby wish. The first feeding should occur soon after birth, and skin-to-skin contact should continue for two hours or until the baby finishes suckling. During that time, the mother is educated by the midwife regarding the

correct position and technique for breastfeeding and the characteristics of correct latching [1,2].

Mother's milk is a complex mixture of precisely those substances that are optimal for newborns, infants, and young children, and constitutes the best medicine for premature infants [2,3]. Yet it may happen that babies requiring care in neonatal intensive care units (NICU) cannot be breast-fed, e.g. due to lack of coordination between suckling and swallowing reflexes, or due to poor health. In such cases, care should be taken to continue feeding with breast milk, and the mother should be educated on pumping, storing, and heating the milk. This is particularly important with regard to preventing the development of pathogenic bacteria and maintaining the optimum properties of breast milk [4].

Breastfeeding has multiple benefits for the child, which also affect their adult life. These include minimizing the risk of obesity, type 2 diabetes, and hypertension, as well as lower incidence of urinary tract infections, NEC, and autoimmune diseases. A number of obstacles exist, however, that may prevent breastfeeding. In such cases, breast milk banks may provide assistance [5,6].

Breast milk – a unique composition

For newborns and infants, mother's milk is the optimum nutrition. Its specific composition contributes to healthy growth and psychophysical development in the first six months of life. Early milk, called colostrum, and transitional milk contain more protein and less carbohydrates than mature milk [7]. These types of milk also contain more vitamins A, D, E, and K, as well as immunoglobulins (particularly IgA), thus protecting the newborn against viruses and toxins produced by other germs [8]. Protein makes up 0.9% of breast milk by volume. The most important proteins in breast milk include immunoglobulins, lysozyme, and lactoferrin. Fat makes up approx. 6% of breast milk, and provides easily assimilable energy, while long-chain polyunsaturated fatty acids play an important role in the development of the central nervous system and the retina. Lactose is the primary

source of carbohydrates in the milk, accounting for approx. 40% of energy intake. Oligosaccharides protect the digestive system by supporting the development of healthy intestinal microbiota. Enzymes, such as amylase and lipase, are involved in the metabolism and synthesis of milk components [7,8]. Breast milk is rich in vitamins, microelements, and macroelements required for health, growth, and hormone production. Breast milk also contains non-protein nitrogenous compounds, such as nucleic acids, nucleotides, creatin, creatinine, and urea, which contribute to nervous system development. Antioxidant content in breast milk, including lactoferrin and vitamins A, C, and E, helps prevent oxidative stress [3].

Breast milk bank – the premise

In Poland, the first breast milk bank was established in Łódź in 1989, but was subsequently closed in the late 1990s [9]. Another breast milk bank was established in Warsaw on 28 March 2012, thanks to the efforts of the Foundation for Breast Milk Banks [10]. Breast milk banks are not a new concept, as humans have used other mothers' milk to feed infants throughout their history. Specialized centers collecting breast milk were first founded in the early 20th century. In 1980, the WHO and UNICEF began popularizing the concept of milk banks due to the increased number of premature infants that needed such assistance. On the other hand, there were concerns about the possible spread of HIV through breast milk, which forced numerous organizations to close. However, the development of pasteurization techniques and epidemiological standards minimized the risk of infection and triggered the dynamic development of breast milk collection centers [11].

In Europe, there are more than 200 active breast milk banks, including 37 in Italy, 36 in France, 27 in Sweden, 20 in Germany, and 7 in Switzerland [12,13]. Poland has 7 such banks, with the latest one established in January 2018 in Rzeszów. New banks are planned in Łódź, Szczecin, and Gdynia [10].

The work of Polish breast milk banks is supervised by the Foundation for Breast Milk Banks, a member

of the European Milk Bank Association. This is a public benefit organization working for the promotion of breastfeeding [10].

Every breast milk bank performs 6 basic functions:

1. Recruitment of suitable donors.
2. Collection of milk.
3. Testing of milk for bacteria.
4. Pasteurization of milk.
5. Storage of milk.
6. Distribution of milk to babies in need [14].

Donations are made on a voluntary basis. The donors do not receive remuneration but do need to meet a number of requirements [6]. First, their medical history and lifestyle are examined. Next, the donors undergo testing for HIV, hepatitis B and C, and other factors [10,14]. A potential donor is definitely excluded if she:

- drinks alcohol on a regular basis;
- smokes;
- uses or has previously used recreational drugs;
- drinks large amounts of caffeinated beverages;
- is vegan (due to deficits of vitamin B₁₂ and folic acid, substances required for infant brain development);
- has had a tattoo or permanent makeup in the past 6 months;
- is chronically ill;
- has contracted HIV, HBV, or HCV;
- has been in a country in the past 6 months where routine testing is not done;
- engages in prostitution or has had casual sexual contacts with a number of different partners;
- has had sexual contacts with a drug-addicted or HIV-infected partner [14].

Other potential exclusion criteria for breast milk donors include:

- diseases presenting with fever in the donor or her family member;
- gastroenteritis;
- mastitis;
- fungal infections, herpes virus infection and other skin diseases;
- vaccination using a live vaccine in the past 4 weeks;
- consumption of alcohol 12 hours before collection;

- use of some medication (including some herbal preparations) [10,14].

Once the recruitment process is completed, each organization provides professional equipment for collecting the milk and a comprehensive set of information regarding milk pumping and storage [10]. Once collected, the milk sample is analyzed for calorie and macronutrient content, i.e. for protein, fat and carbohydrates [15].

As breast milk is not sterile, and the immune functions tend to be compromised in premature babies, each sample collected undergoes strict testing for bacteria. Even with strict adherence to hygiene by the donor, the milk may contain bacteria (mainly Gram-positive) that were present at the milk duct endings and on the breast surface [1,14,16]. Subsequently, donated milk is pasteurized under strictly monitored conditions [15]. The milk should be re-tested for bacteria after pasteurization, as some microbes are resistant to high temperature, and could harm the baby given the milk. The milk can be used freely if the bacteria count is lower than 10³ per milliliter (or 10³–10⁵ per milliliter in the case of bacteria constituting normal skin flora) [14].

Each bottle of milk collected is marked with a unique code, containing the donor's identification and health data, the date of milk collection and pasteurization, a serial number, and an expiration date [14,15]. A portion of milk that has been pasteurized and coded correctly can be stored for several months at –20°C [14].

Due to the work of breast milk banks, portions of breast milk are distributed to newborns who need it the most. Breast milk is treated as medication and administered by prescription and is used to help ill or premature babies in recovery [15].

According to a 2016 study, awareness of the existence of breast milk banks is increasing, but the vast majority of women would not donate their milk. This is caused by insufficient information on the operation of these institutions. However, women who declare themselves unwilling to donate their breast milk stated they could change their mind if provided with precise instructions and information on the donation procedure [6].

Summary

Breast feeding is the best way of feeding newborns. It protects the baby against infection and a range of diseases, limiting the need for costly medication. If the baby cannot be breastfed by the mother, milk can be obtained from a breast milk bank [7,11]. Women who are pregnant or plan to become pregnant should be educated on the operation of breast milk banks, the rules and requirements for potential donors, and costs involved in milk donation or reception. Midwives who are qualified lactation consultants should educate patients on the need for breast milk donors, the benefits of lactation, and places where a woman can donate her milk. These actions may increase the willingness to donate breast milk in banks, thus helping newborns in need [6]. Human breast milk may also be used to treat wounds or diseases with poor prognosis, though further research is required to provide a more in-depth understanding of the medical uses of breast milk [9].

Due to the need for breast milk for premature babies, a breast milk bank should exist in each hospital with the highest referral level, or at a minimum, in all major cities [6].

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