Characteristics of breast milk and serology of women donating breast milk to a milk bank

P C Lindemann, I Foshaugen, R Lindemann


Objective: Breast milk is the most important nutrient to all newborn babies. If the mother’s milk production is insufficient, it is important to provide donor breast milk without reduction of its immunologic and antimicrobial properties. Early use of breast milk to preterm infants has shown a reduced incidence of necrotising enterocolitis, a faster tolerance of enteral feeding, and a reduced need of parenteral nutrition. It is important to have milk from a CMV-IgG negative donor to VLBW infants considered immunocompromised.

Methods: Between January 1st and December 31st 2001, 69 women delivered 1,973 litres (mean 28.6 litres/woman/year). 73% had college education, were primipara, and with a mean age of 30.7 years. Those who smoked, used alcohol or any medications were refused as donors. They started to deliver approximately 7 weeks after having given birth and continued for a mean of 4 months. Each milk sample was tested for bacterial growth. Every donor was screened for HIV, CMV-IgG and hepatitis B/C before donating milk and thereafter every third month.

Results: 62.3% was CMV-IgG positive. Samples containing Staphylococcus aureus, klebsiella-, enterobacter- and serratia-species or E. coli, and all samples containing > 10^4 cfu/ml were pasteurised. Overall, only 10.5% of the samples were pasteurised.

Conclusion: It is possible and important to provide VLBW babies with fresh frozen unpasteurised CMV-IgG negative breast milk until their own mothers’ milk production is sufficient.

RESULTS

The women started to donate milk about seven weeks (median) after having given birth (range 1–21 weeks) and continued for a mean of four months (range < 1–13). During the study period, the women delivered a total of 1,973 litres breast milk (mean 28.6 litres/woman/year). The total amount of milk donated was 2,673 litres, with a mean amount of 38.7 litres/woman. The highest amount from one woman was 392 litres. Two thirds of the mothers were CMV IgG positive (62%). None tested positive for HIV or hepatitis B or C.

Samples containing Staphylococcus aureus, Klebsiella-, Enterobacter-, Serratia-species, or Escherichia coli were not accepted as “fresh frozen” and were thus pasteurised. All samples with a bacterial count of more than 10^4 colony forming units/ml were pasteurised (56°C for 30 minutes). All the pasteurised samples were retested for bacterial growth and only accepted when germ-free.

MATERIAL AND METHODS

Between 1 January and 31 December 2001, the serological status of donors and the characteristics of the milk donated to the milk bank at Ulleval University Hospital were studied. Women who smoked or used alcohol or any drugs were refused as donors.

The women were carefully instructed in hygienic procedures and how to clean the equipment. A breast milk pump and single use paper towels were provided. The women were paid NOK 135/litre donated tax-free (equal to €16/£10/$19).

Most of the donors had received a college education (73%) and were primiparous, with a mean age of 33.8 years. Table 1 shows their basic details.

Most of the women delivered at term, but some had preterm babies. The median birth weight of the children was 3360 g (range 630–4500), the smallest with a gestational age of 27 weeks, showing that some mothers expressed more milk than their preterm infant needed.

Every donor had a screening test for HIV during her pregnancy, before donating milk and then every third month, in addition to tests for CMV and hepatitis B/C. Each milk sample was tested for bacterial growth.

Samples containing Staphylococcus aureus, Klebsiella-, Enterobacter-, Serratia-species, or Escherichia coli were not accepted as “fresh frozen” and were thus pasteurised. All samples with a bacterial count of more than 10^4 colony forming units/ml were pasteurised (56°C for 30 minutes). All the pasteurised samples were retested for bacterial growth.

None of the infants acquired S aureus infections from bank milk as all samples containing any of this bacterium were pasteurised. Infants assumed to be immunocompromised (< 1500 g/≤ 32 weeks) were fed CMV IgG negative bank milk. We did not test the infant’s own mother for her CMV status. She usually expressed more milk than her baby tolerated, and milk samples were therefore kept frozen.
DISCUSSION

Human breast milk is considered to be the most important nutrient for newborn babies especially VLBW ones. Owing to its anti-infectious effect and immunoglobulin content, breast milk is preferable to preterm milk formulas.1–6 If a mother has its anti-infectious effect and immunoglobulin content, breast milk is preferable to preterm milk formulas.1–6 If a mother has her own milk production is established.

VLBW infants are considered to be immune incompetent, with an increased risk of developing serious infections.1–5 The use of intravenous IgG has, however, been debated.16–17 The content of immunoglobulins (IgA) in breast milk is therefore of great importance for the protection of the immunocompromised VLBW infants.6

Bank milk should therefore contain no bacteria that may cause infection or ≥ 10^4 colony forming units/ml of any bacteria.18 Milk from a milk bank should also be free of infectious viruses, such as CMV, hepatitis B/C, and HIV. The donor should have a negative serum screen for these viruses before starting to donate milk.

Necrotising enterocolitis is a serious disease that can affect the VLBW infant. It has been shown that breast milk protects against the development of this disease,4–11 supporting the importance of the early introduction of breast milk to preterm infants.4–5

Even though the fetus swallows amniotic fluid, the intestine is not prepared for enteral feeding. It has, however, been shown that early enteral feeding, even small amounts (trophic feeding), improves gut motility and thereby the tolerance of enteral feeding in the VLBW infant.14–15

Early tolerance of enteral feeds means that the need for parenteral nutrition is reduced. As parenteral feeding is associated with, among other things, increased risk of infections, liver impairment, and thrombocytopenia,16–19 early introduction of breast milk will thus reduce these complications.

To be able to provide fresh frozen human breast milk to every VLBW infant, it is important to maintain a milk bank and thus the possibility to provide the optimum substitute for mother’s own milk.

It has been debated whether fresh frozen milk donated to a milk bank from a CMV IgG negative mother is superior to the milk from the infant’s own mother, not knowing or before knowing her CMV status.20–21 Should a CMV positive mother be allowed to breast feed her own child? Or should her milk be kept frozen for three or more days or even pasteurised? It is important to look out for signs of CMV infection in VLBW infants fed their own mother’s milk without knowing her CMV status. If any of our infants develop severe pulmonary problems, a sample of their urine is tested for CMV. If the test is positive, the infection is more likely to come from its mother than from the banked milk.

The use of fresh frozen unpasteurised bank milk promotes enteric feeding of live microbial supplements (probiotics) which may provide benefit and help to prevent diseases such as necrotising enterocolitis.22

This study shows that our milk bank is run safely, providing optimal growth and development of the infant.
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Arch Dis Child Fetal Neonatal Ed 2004 89: F440-F441
doi: 10.1136/adc.2003.046656

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