Loss of energy during continuous infusions of breast milk

Continuous feeding by intragastric or transpyloric milk infusion is currently popular in neonatal nurseries. We have noticed that human breast milk leaves a much greater residue in the burette and tubing at the end of an infusion than cows' milk formula. Since the residue looks fatty, we thought it worth investigating the change in total milk energy during infusions, in case appreciable amounts were being lost in discarded infusion sets.

Methods

Experiments were carried out with expressed human breast milk. This was delivered from a Metriset burette to a series of beakers via a standard 2 m length of polyvinyl tubing, at flow rates ranging from 10–25 ml/h. During infusion the milk was kept at a room temperature representative of that found in special care baby units (30–31°C). Samples were collected for analysis at timed intervals (1–2 h) for 8–12 h. We included a well mixed sample of each milk as a base line, and also the residue in the burette and tubing at the end of the infusions, which was washed out with distilled water. The samples were of equal volume (15–25 ml), and the residue in the burette and tubing was approximately the same volume before dilution with the washings. All the samples were freeze dried. Total energy content of the dried milk was determined by bomb calorimetry (Miller and Payne, 1959). Each sample was analysed in triplicate.

Results

The results were essentially similar in each of 9 separate experiments: a decline in the energy content of the samples collected in the first 4–5 h of the infusion, followed by a rise which culminated in a peak energy value in the residual sample about 16% above that of the well mixed milk. This trend is shown in Fig. 1. The difference in energy content between the 2-hour sample and the residual sample was significant at the 2% level, using the t-test applied to paired comparison (t=2.9, P<0.02). The rate of decline in energy content of the early samples was not correlated with the rate of infusion. Since the timing of the sample with the lowest energy content ranged from 1 to 5 hours after the start of the infusion, we have compared initial energy and residual energy with the mean of the lowest energy values (Fig. 2). Mean minimum energy was 11% below that of the mixed milk, and 24% below the residual energy. These differences were highly significant using the paired t-test.

Fig. 1 Mean change (± SEM) in energy content of breast milk during infusion over 8–10 hours (9 experiments).
Discussion

The changes in energy content of breast milk during slow infusions are large enough to confuse energy calculations and lead to a reduction in energy intake. From the shape of the curve in Fig. 1, we suppose that the milk fat separates rapidly after the infusion is set up. This results in the lower energy content of the 2–4 h samples, which are presumably relatively low-fat. Thereafter increasing amounts of the upper fatty layer appear in the samples, and the final residuum contains a disproportionate amount of fat, both as the remains of the high-fat layer and as fatty scum adherent to the burette.

We suggest that it is important to agitate the milk in the burette at least hourly to ensure that it remains reasonably well mixed when this type of feeding is used.

Summary

During 9 experiments simulating continuous intragastric infusion of human breast milk, variations in milk energy content of up to 24% occurred, the samples taken at the end of 8–12 hours' infusion being particularly energy-rich compared with earlier samples. Burettes should be regularly agitated during infusions of human milk.

Reference


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Fig. 2 Lowest and highest energy during 9 infusion experiments compared with well mixed milk (±SEM).

Systemic lupus erythematosus presenting as chorea

Systemic lupus erythematosus (SLE) is uncommon in childhood and is predominantly a female disease (80–90%) (McLean et al., 1975). Multisystem involvement most commonly includes skin, central nervous system (CNS), and kidney. CNS disease is present in 20 to 75% of patients (Johnson and Richardson, 1968; Singsen et al., 1976) and is the second most common cause of death. Although there may be numerous presentations of CNS disease, chorea as the initial presentation is rare; there are only 31 reported cases (Lusins and Szilagyi, 1975) and few of these were children. We report a boy who presented with chorea and had a dramatic response to haloperidol.

Case report

An 11-year-old Caucasian boy was admitted to our hospital on 11 August 1976. Approximately one month before admission he developed an erythematous macular rash on the face, arms, and palms. The lesions on the arms were scaly and located more on the extensor surfaces. He had been treated symptomatically with diphenydramine (Benadryl).

Three days before admission he noticed weakness, and was unable to sit well, eat, or dress himself because of awkward movements. His mother also noted emotional lability and slurred speech as well as facial grimacing. His history was negative and the family history was negative for any collagen-type disease.

He weighed 51.7 kg (6.8 kg weight loss in the previous 4 weeks). Blood pressure was 120/70 mmHg. An erythematous maculopapular rash was present on the face in the malar areas, and on the extremities and trunk, particularly the buttocks. On neurological examination he was alert, co-operative and oriented. His speech was slurred, and he showed facial grimacing, choreoathetoid movements, and evidence of dyskinesia. Initial blood count showed Hb 11.4 g/dl, haematocrit 33%, WBC 4.2 × 10^9/l with 69% polymorphonuclears, 29% lymphocytes, and 2% eosinophils; erythrocyte sedimentation rate 42 mm/h; blood urea nitrogen 26 mg/100 ml (9.28 mmol/l). Repeat blood urea nitrogen examinations were normal. Initial LE cell preparation was negative, rheumatoid factor weakly positive, fluorescent antinuclear antibody weakly positive, urinalysis negative, x-ray studies within normal limits. Initial electroencephalogram (EEG) showed nonspecific slowing. Sydenham’s chorea was ruled