

Sucking on the 'emptied' breast: non-nutritive sucking with a difference

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Abstract

A simple method to promote the use of human milk and subsequent breast feeding in low birthweight infants was evaluated in 32 babies. In the 'intervention' group (n=16; mean (SD) weight 1559 (228) g and length of gestation 33.2 (1.8) weeks), infants were allowed to suckle at the breast when their general condition permitted after as much milk as possible had been expressed, and were then given the full required feeds by tube. Full breast feeding was started as soon as the infant could suck adequately. Sixteen control infants (mean (SD) weight 1605 (198) g and length of gestation 34.1 (2.4) weeks), were breast fed in the conventional manner only after it had been established that they could suck well; until then they received all their feeds by tube. After discharge the mean (SD) periods of exclusive and total breast feeding were longer in the group that had received the intervention (3.7 (1.3) and 5.1 (2.2) months, respectively) than among the controls (1.9 (0.6) and 3.3 (1.9) months, respectively).

This 'intervention' method helps to promote milk formation, provides sucking experience for low birthweight infants without interfering with their nutritional intake and consequent weight gain, and encourages subsequent breast feeding with its well recognised advantages.

When human milk is used to feed low birthweight infants, continued flow of milk may present problems especially if weight and gestation are low, the suck is weak, and the period of separation long. Maternal anxiety and medical problems make things worse. Giving the mothers emotional support by encouraging early contact and participation in the non-specialised care of their infants is helpful.^{1 2}

Initiating and maintaining breast feeding in a young low birthweight infant before he or she is fully ready for it may result in inadequate weight gain or even weight loss, and supplementing nutrition by tube feeding when the stomach is partially full after an attempted breast feed can create its own problems. We observed that low birthweight infants could suckle at the breast after as much milk as possible had been expressed, and could then be given the full required feeds by tube. This study was set up to evaluate this intervention, which we called suckling on the 'emptied' breast.

Patients and methods

Thirty two low birthweight infants weighing

less than 1800 g who could not accept direct breast feeding were enrolled in the study. Infants who could be enterally fed after delivery were tube fed with intermittent boluses through an orogastric tube (the routine in the unit). Sick and very low birthweight infants initially received parenteral glucose electrolyte solutions, and enteral feeds were started as soon as their condition permitted; the volume was gradually increased to 200 ml/kg. Infants usually received their own mothers' milk supplemented where required by suitable donor milk. If human milk was inadequate, supplementary milk feeds using a locally available partially adapted formula were given. During this period another study was in progress in the unit to evaluate weight gain with human milk enriched by the addition of local powdered milk formula (unpublished observations), and hence some infants were receiving the latter.

The intervention itself comprised the following steps: the mother was asked to express the milk as completely as possible from both breasts (in the unit manual expression was practised as is common in developing countries)³; the infant was then put to the breast in a warm room and allowed to suckle. Finally the full calculated volume of milk was given by intermittent bolus by the orogastric route.

In the pretesting phase it was noted that excessive sucking in the early stages sometimes resulted in inadequate weight gain or even weight loss. Initially, therefore, sucking was permitted for only a brief period. The number of episodes and sucking time were gradually increased, care being taken to monitor the weight daily until the infants were allowed to suck for as long as they wanted to before tube feeds, the end point being when the infant stopped sucking on his own. As infants became stronger, full breast feeding was started and this gradually replaced the combination of 'emptied' breast sucking and tube feeding. A single bottle feed was tried to start with to judge the infant's sucking capacity before initiating full breast feeds.

Control infants were treated in a similar manner as far as intermittent tube feeds were concerned, and were also given to mothers to hold and cuddle. They were, however, put to the breast in the conventional manner only after it had been established that they could suck adequate volumes from trial feeds; gradually, then, all tube feeds were replaced by breast feeds. The bottle was not used routinely for giving breast milk.

An attempt was made to allot alternate mothers to the intervention and control groups,

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but this was impossible as the procedure so caught the fancy of mothers that whenever they saw another mother carrying out the procedure they insisted on following suit. We therefore evaluated a small group of mother-infant pairs ($n=8$) as controls treated in the conventional manner and after all these had been discharged we initiated the intervention group ($n=8$) and then repeated the cycle. Permission was obtained from mothers for the intervention, but it was merely a formality. Statistical analysis was by Student's t test and the χ^2 test as appropriate.

Results

The hospital where the study was carried out catered to a mixture of social classes. As statements regarding income were invariably unreliable, emphasis was laid on maternal education; this is shown in table 1 together with other maternal characteristics such as age, experience of breast feeding, presence of older women in the home, and outside employment. In the intervention group 81% and in the control group 88% had had some form of education. There were no significant differences between the groups for any of the variables.

The intervention could be started when an infant was aged 10 (2) days. Initially tiny pre-term babies merely 'mouthed' the nipple when put to the breast but they soon established defi-

nite sucking, which subsequently was noted to be well sustained with bursts of sucking activity alternating with periods of rest. No infant had any episodes of choking during the interventions or during the subsequent introduction of the feeding tube. Aspiration before starting feeds showed either no milk or—in older infants—less than 5 ml.

Table 2 shows characteristics of the infants. Again there were no significant differences between the two groups in sex distribution, mean birth weight, gestation, or presence of early neonatal problems such as birth asphyxia, respiratory distress, or hyperbilirubinaemia. The duration of parenteral fluids and the various types of milk feeds were similar in the two groups, as were the weight at discharge and duration of hospital stay.

A separate evaluation of the weight gain was made among infants weighing less than 1500 g (10 in the intervention group and nine among controls). As shown in the figure weight gain was similar in the two groups. Table 3 shows the final outcome noted at follow up, which was carried out until breast feeding was completed. Three babies in the intervention group and six controls were already receiving supplementary milk feeds at the time of discharge. Two infants in the control group were not breast fed at all after discharge, the mothers saying that they did not have sufficient milk. These differences, however, were not significant in this sample

Table 1 Maternal characteristics

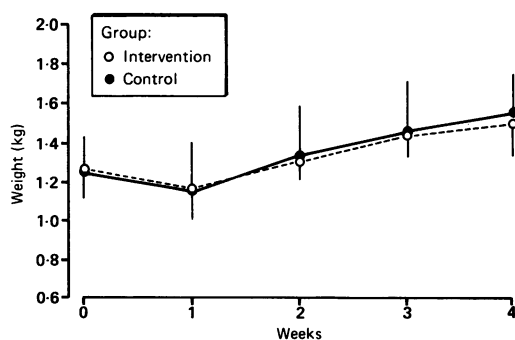
	Intervention group ($n=16$)	Control group ($n=16$)	t/χ^2	p Value
Mean (SD) age (years)	27.5 (3.6)	28.6 (3.6)	$t=0.87$	>0.05
Education:				
Nil	3	2	$\chi^2=0.05$	>0.05
School	3	4		
College	10	10		
Breast feeding experience	9	20	$\chi^2=0.13$	>0.05
Residential older women	7	9	$\chi^2=0.50$	>0.05
Outside employment	5	2	$\chi^2=0.73$	>0.05

Table 2 Infant characteristics

	Intervention group ($n=16$)	Control group ($n=16$)	t/χ^2	p Value
No of boys	9	11	$\chi^2=0.53$	>0.05
Mean (SD) birth weight (g)	1559 (228)	1605 (198)	$t=0.62$	>0.05
Mean (SD) gestation (weeks)	33.2 (1.8)	34.1 (2.4)	$\chi^2=1.21$	>0.05
No with early neonatal problems	5	4	$\chi^2=0$	>0.05
No on parenteral fluids	10	9	$\chi^2=0.13$	>0.05
Mean (SD) duration (days) of parenteral feeding	11.5 (3.5)	11.8 (4.1)	$t=0.22$	>0.05
Milk feeds:				
Expressed human milk alone	5	5	$\chi^2=0$	>0.05
Enriched expressed human milk (see text)	5	6	$\chi^2=0.14$	>0.05
Expressed human milk and formula	6	5	$\chi^2=0.14$	>0.05
Mean (SD) discharge weight (g)	1752 (100)	1742 (135)	$t=0.24$	>0.05
Mean (SD) hospital stay (days)	24.3 (9.5)	23.1 (9.8)	$t=0.36$	>0.05

Table 3 Outcome

	Intervention group ($n=16$)	Control group ($n=16$)	t/χ^2	p Value
No on artificial milk at discharge	3	6	$\chi^2=0.62$	>0.05
No not breast fed after discharge	—	2		
Mean (SD) duration of exclusive breast feeding (months)	3.7 (1.3) ($n=13$)	1.9 (0.6) ($n=10$)	$t=4.05$	<0.001
Mean (SD) duration of total lactation (months)	5.1 (2.2) ($n=16$)	3.3 (1.9) ($n=14$)	$t=2.35$	<0.05



Patterns of weight gain in infants weighing less than 1500 g in the intervention group ($n=10$) and the control group ($n=9$). The values are expressed as mean (SD).

size. On the other hand, the period of exclusive breast feeding and the total duration of lactation were significantly longer in the intervention group.

Discussion

In 1983 Bernbaum *et al* noted that sucking on a pacifier enhanced the maturation of the sucking reflex, improved weight gain, and even reduced hospital stay.⁴ Paediatricians in developing countries usually discharge low birthweight infants far earlier than their Western counterparts. A higher proportion of mature infants with retarded growth in the Third World is one of the reasons that we are able to initiate oral feeds earlier.⁵ Overcrowding and potential risk of infection in some units are additional motivating factors for early discharge. Under these circumstances the use of pacifiers to stimulate the more premature and very low birthweight infants cannot be recommended because their use is likely to be perpetuated and could further predispose to infection, particularly after discharge from the hospital, as well as interfere with breast feeding.

The potential risk of HIV infection has unfortunately had a detrimental influence on the use of donor breast milk, and policies not only vary in different units, but need to be revised periodically to suit changing local requirements. Wherever breast milk is used, however, promotion of subsequent breast feeding must also be a priority.

A number of methods have been tried to initiate early oral feeding both in hospitals and in the community in the Third World. The innovative 'kangaroo' method with close early contact and start of breast feeding has aroused considerable interest.⁶ The use of a spoon, cup,⁷ or an easily cleaned traditional feeding device⁸ are also widely used in developing countries. A controlled trial of skin to skin contact by the kangaroo method in a developed country has also shown that it has a beneficial influence on breast feeding.⁹ Preterm infants are handicapped by their limited intakes, initially poor ability to suck, and speed with which they tire, and a balance has to be maintained between energy intake and expenditure so that optimal weight gain can be ensured. Excessive physical stress, as in early initiation of breast feeding, may result in inadequate intake and poor weight

gain. This applies even to sucking on the 'emptied' breast described in this paper, as excessive sucking in the early stages may not be suitably compensated for by the nutritional intake.

Interestingly, Bernbaum *et al* attributed the increased weight gain that they noted in infants who sucked pacifiers to one or more of the following reasons: sucking was believed to stimulate secretion of sublingual lipase with associated improved fat absorption from formulas; it also resulted in better oxygenation and decreased restless activity.⁴ These findings were supported by Field *et al*¹⁰ and Measel and Anderson.¹¹ In the present study, however, we did not note an improved weight gain in the infants. Possible explanations for this finding could be that raw human milk containing lipases was the main milk used in both groups and also that even control infants had some sucking experience as they tended to suck on the orogastric feeding tube. The recent study by Ernst *et al* has also failed to show improved weight gain and decreased hospital stay with non-nutritive sucking on a pacifier.¹² When the sucking is at the breast, however, the impact on lactation that we have shown in this study seems to be appreciable. In developed countries where mothers and staff are motivated to use human milk, continuation of milk flow and emotional satisfaction should be benefits. In developing countries, use of human milk has a significant influence on the infective morbidity and mortality in high risk infants.¹³ Even in units where infections may not be a major problem it is still important to ensure that the long term outcome is acceptable if the resources and efforts expended on these infants at risk in the neonatal special care unit are to be justified. In this context longer periods of exclusive and total lactation can influence more long term infective morbidity after discharge particularly among the less privileged groups,¹⁴ and emotional satisfaction is an added bonus.

As noted earlier, most of the mothers in this study had had some education. In the Third World it is this group that does not seem to be so successful in sustaining lactation,¹⁵ and hence the findings in this report are all the more important.

We have since found this intervention to be of use also in larger full term infants who are convalescing from illnesses such as birth asphyxia, respiratory distress, or major infections, at a stage when the infants are improving but are not strong enough to accept full direct breast feeds. The weaker, younger, smaller, and more preterm infants do not suck strongly enough to swallow any appreciable volumes, and the few ml sucked by the stronger, older, larger, and more mature ones not only contain the fat rich hind milk,¹⁶ but also do not seem to interfere with subsequent tube feeds. With better observation even 'trial' bottle feeds can be dispensed with, as the occurrence of good sustained sucking at the emptied breast can be made out to determine the stage at which direct breast feeding can be introduced.

In conclusion, this is a simple intervention, which is useful not only to stimulating sucking

but also to promote maternal milk flow and prolonging lactation in mothers of high risk infants, with all its attendant benefits.

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Prorenin and diabetes

Outside the entrance to our hospital there appeared a large poster proclaiming that Susan stands in the shadow of diabetes and its complications. The need to collect money, it seems, overrides any possible adverse effect on young patients of such advertising even in the minds of those who run the national charity for people with diabetes.

A prime aim of treating childhood diabetes must be to prevent the adult complications if possible and several ways of identifying diabetic children at risk have been proposed.¹ Fifteen years ago Dr John Luetscher and colleagues at Stamford University, California, reported finding 'big renin' in the plasma of diabetic patients with nephropathy,² and in a recent article in the *New England Journal of Medicine* (1990;323:1101-6) Wilson and Luetscher show that plasma prorenin activity is raised in children who later develop retinopathy or nephropathy. They studied 135 patients in a children's diabetic clinic. Albuminuria or retinopathy began to appear from the age of 12 years. About 80% of the patients who developed these complications had raised plasma prorenin at some time and this could be found in some patients up to three years before the appearance of the complication though in others the latent interval was apparently much shorter.

There seems to be little point in measuring plasma prorenin before the age of 10. Young children have relatively high values, which gradually decline to between 9 and 12 years of age. In this study young children who initially had values above the normal limit for age had normal values on repeat testing.

Over the age of 10 a high plasma prorenin may precede microangiopathy. It remains to be seen whether attempts at better diabetic control in these patients might prevent or delay the complications.

ARCHIVIST

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