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NUTRITION

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UNICEF/WHO baby-friendly hospital initiative: does the use of bottles and pacifiers in the neonatal nursery prevent successful breastfeeding?

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Abstract To promote breastfeeding, UNICEF/WHO have launched the "baby-friendly hospital initiative" focusing on hospital care routines during delivery and the first days of life. In industrialised countries, two aspects of the initiative have raised controversy: how do restriction of supplemental feedings and ban of bottles and pacifiers affect long-term breastfeeding performance? From ten centres 602 healthy newborns were randomly assigned either to a UNICEF group with restrictive fluid supplements and avoidance of bottles and pacifiers during the first 5 days of life, or to a standard group with conventional feeding practice. Breastfeeding was encouraged in both groups. The main study endpoints were the prevalences of breast-feeding on day 5, and after 2, 4 and 6 months. Of the newborns 46% violated the UNICEF protocol, mostly because of maternal requests to give a pacifier or supplements by bottle. In the standard group, the drop-out rate was 9.7%. No significant differences in breastfeeding frequency and duration could be found: (UNICEF vs standard) day 5: 100% vs 99%; 2 months: 88% vs 88%; 4 months: 75% vs 71%; 6 months: 57% vs 55%. Inclusion of drop-outs due to pacifier use did not alter the results.

Conclusion In our study population fluid supplements offered by bottle with or without the use of pacifiers during the first 5 days of life were not associated with a lower frequency or shorter duration of breastfeeding during the first 6 months of life.

Key words Breastfeeding · Supplementary feeding · Neonatal · Bottles · Pacifier use

Abbreviation *DM* 10% dextrin-maltose-solution

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Introduction

Since the early 1990s UNICEF/WHO have been awarding the title of "baby-friendly hospital" to maternity services which followed their promotional programme "ten steps to successful breastfeeding" [25]. Eight of the ten steps focus on education, motivation and attitude of parents and healthcare staff regarding breastfeeding, as well as hospital care routines which allow the baby to breastfeed immediately after delivery. Rooming-in of mother and child, and availability of professional breastfeeding counselling are additional elements proposed by the initiative. Studies and experience provide evidence of the validity of these steps [12, 15, 16, 20, 27, 28]. Certain difficulties arise, however, in industrialised countries with regard to steps 6 and 9:

> Step 6: Give newborn infants no food or drink other than breast milk, unless medically indicated.
> Step 9: Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.

In countries with low hygienic standards, the risk of infection by contaminated bottles, pacifiers and supplemental liquids justifies these two steps. Furthermore, supplemental feeding during the 1st week of life may negatively affect breastfeeding. However, the published results may have been biased as they were derived from retrospective or non-randomised studies [2, 4, 13, 27]. The question also remains whether the use of baby-bottle teats or pacifiers is a symptom or a cause of sucking difficulties or so-called "nipple confusion" [5, 18, 23]. The purpose of this study was to examine the need for strict adherence to steps 6 and 9 of the UNICEF guidelines in industrialised countries.

Subjects and methods

Maternity services of ten Swiss hospitals agreed to participate in this multicentre prospective randomized trial. After obtaining pa-

rental consent, eligible healthy newborns were randomly assigned to one of the following two groups during their hospital stay:

1. *UNICEF* group: supplements, if medically indicated, were administered by cup or spoon; bottles, teats and pacifiers were strictly forbidden.
2. *Standard* group: supplements were conventionally offered by bottle after breastfeeding [22]; pacifiers were offered to all infants without restriction.

In both groups, the fluid supplements during the first few days consisted of a 10% dextrin-maltose-solution (DM). Fluid supplements were considered to be medically indicated in the following situations: babies agitated or screaming after breastfeeding; signs of dehydration (no urine output over 4 h after day 1); symptoms of hypoglycaemia with blood glucose < 2 mmol/l. In the standard group fluids were more liberally offered (e.g. once or twice a day).

Infant formula was allowed only from day 4–5 if the baby had lost $> 8\%$ of his/her birth weight and if there was evidence of insufficient lactogenesis.

In order to be allowed to participate, hospitals were required to have established functioning breastfeeding programmes with early initiation of breastfeeding, lactation consultants, unrestricted rooming-in, as well as a policy of restricted use of infant formula supplements. Only healthy full-term infants (>37 weeks of gestation, 2750–4200 g) of mothers who intended to stay in the hospital for 5 days postpartum and planned to breast-feed for ≥3 months were eligible. Upon discharge from the hospital, it was left to the mothers of both groups to decide, whether to use a pacifier and/or bottle.

Before the initiation of the study, one of the authors (O.T.) and a lactation consultant visited the ten participating institutions to explain the purpose of the study, and the technique of cup [14] and spoon feeding. Sealed protocol forms were centrally randomized and distributed to each centre.

Data collection

Frequency of breastfeeding, DM or infant formula supplementation, weight and phototherapy were recorded daily for 5 days. Sucking behaviour was subjectively judged by the nurse in charge of the mother as good, mediocre or insufficient.

Questionnaires were sent to mothers at 2, 4 and 6 months to request feedback on: breastfeeding, introduction of supplementary nutrition and use of pacifiers.

For data analysis the following definitions were used: fully breast-fed meant feeding with breast milk only or with breast milk and nutritionally insignificant amounts of water-based liquids according to WHO definitions [26]; partially breast-fed meant feeding predominantly with breast milk with additional formula or beikust.

Statistics

Assuming a breastfeeding rate of 90% in the standard group at 2 months of life, we estimated that 235 infants would have to be randomized to each group of the study to detect a 10% difference with a power of 0.95 at ($\beta = 0.05$) [3]. In anticipation of frequent protocol violations we enrolled a total of 600 infants. The two groups were statistically compared by Student's *t*-test and Mann-Whitney U-Test. Pearson's chi-square test was used for categorical data. Data are expressed as mean ±SD. $P < 0.05$ were considered significant. The computer package SPSS, version 5.0.1 was used.

Results

A total of 602 infants met eligibility criteria and were enrolled after parental consent was obtained. The characteristics of the study population and their distribution within the two groups are given in Table 1. There was a high rate of protocol violations in the UNICEF group: In 9.5% of the cases cup or spoon feeding proved to be too difficult or the mother preferred to give fluid supplements by bottle. In 23.8% of the cases the mother wanted to use a pacifier; a 6-month follow up of this latter group of 70 infants was also done.

Table 1 Characteristics of the study population

	UNICEF	standard
Involved mother-child-pairs	294	308
Boys (%)	52.8	45.4
Birth weight (g ± SD)	3367 ± 319	3404 ± 348
Gestational age (weeks ± SD)	39.9 ± 1.4	39.9 ± 1.2
Maternal age (years ± SD)	30.8 ± 4	31.0 ± 4
Parity (birth ± SD)	1.7 ± 0.7	1.8 ± 0.8
Caesarean section (%)	10.1	10.2
Protocol violations (1st week)	114	17
– mother requested bottle	−19	
– mother requested pacifier	−70	
– failure to spoon/cup-feed	−9	
– early discharge	−6	−11
– others	−10	−6
Lost to follow up	23	13

During the first 5 days, virtually all children were sucessfully breast-fed (Fig. 1). Although in both groups most of the children received one or more supplements of DM solution, the total number of additional DM feedings during the first 5 days was significantly lower in the UNICEF group (6.1, range 0–18 vs 7.3, range 0–24; $P < 0.019$, Mann-Whitney U-Test) (Table 2). Infant formula was given to 2.8% of the infants in the UNI-

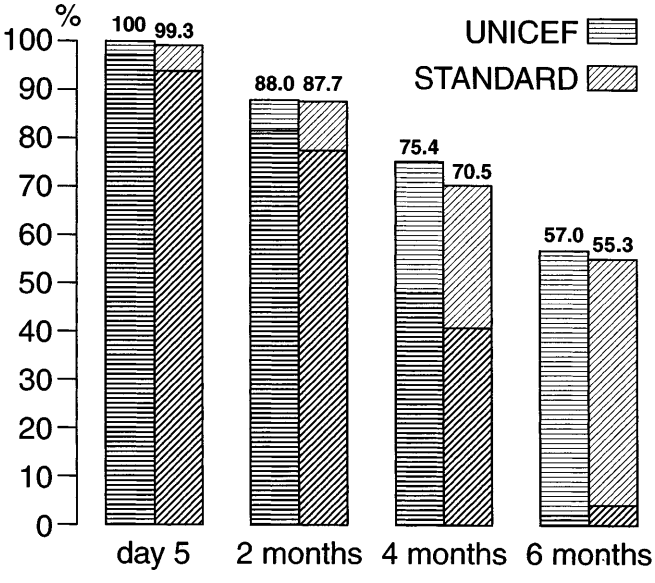

Fig. 1 Incidence of breastfeeding at day 5 and at age 2, 4 and 6 months. UNICEF group: restrictive supplemental fluids (if indicated given by spoon or cup), no bottles or pacifiers allowed. Standard group: supplements conventionally offered by bottle, unrestricted use of pacifiers. *Dark bars* indicate fully breast-fed, *light bars* partially breast-fed. There is no significant difference

Table 2 Results day 1–5

	UNICEF (*n*)	UNICEF (%)	Standard (*n*)	Standard (%)
Protocol completed	180	100	291	100
Fully breast-fed on day 5	180	100	289	99.3
Breast-fed/no supplements	15	8.3	10	3.4*
Breast milk/formula supplements	5	2.8	13	4.5
Breast milk /DM supplements	160	88.9	268	92.1
Number of DM supplements				
– day 1 (mean/child)	1.7		2.2*	
– day 2 (mean/child)	2.2		2.6*	
– day 3 (mean/child)	1.3		1.4	
– day 4 (mean/child)	0.7		1.0	
– day 5 (mean/child)	0.4		0.5	
Mean neonatal weight loss		−5.8%		−5.5%
Sucking behaviour				
– good		91.6%		90.8%
– mediocre		6.4%		7.5%
– insufficient		2.0%		1.7%
Incidence of fever	1	0.6	3	1.0
Incidence of phototherapy	4	2.2	9	3.1

* $P < 0.05$

CEF group compared to 4.5% in the standard group (P = N.S.).

During the first 5 days, no statistically significant differences (UNICEF vs standard) were observed in sucking behaviour (good 91.6% vs 90.8%; mediocre 6.4% vs 7.5%, insufficient 2% vs 1.7%), mean neonatal weight loss, incidence of fever, and incidence of phototherapy (Table 2). No symptomatic hypoglycaemia was detected in any of the infants.

Figure 1 shows the percentage of fully or partially breastfed infants on day 5 of life and during follow up at 2, 4, and 6 months of life. At no point in time was there a significant difference between the two groups. The combined totals for each group (UNICEF vs standard, respectively) were: day 5: 100% vs 99.3%; 2 months: 88% vs 87.7%; 4 months: 75.4% vs 70.5%; 6 months: 57% vs 55.3%. If the infants who dropped out from the UNICEF group due to pacifier use during the 1st week of life were included the following breastfeeding rates resulted: 2 months: 87.7%; 4 months: 74.0%; 6 months: 58.9%.

At 2 and 4 months, pacifier use in both groups was not significantly different and ranged between 69%–76%.

Discussion

There is no doubt, both from a physiological and psychological point of view, that breastfeeding is the optimal form of nutrition for infants. Promoting and supporting breastfeeding is therefore a global health issue [6].

The UNICEF/WHO's "ten steps to successful breastfeeding" are valuable guidelines for hospitals. Some recommendations, however, without having a solid scientific basis, go perhaps too far and do not take into account different cultural and ethnic patterns in mothering a child. As mentioned in the introduction, this refers in particular to steps 6 and 9 which were the focus of this study.

Step 6 (use of supplements)

Since ancient times, infants have received some liquid supplements in the very first days of life before sufficient lactogenesis occurs, mainly in the sense of purges for removing meconium [7]. Nowadays, additional liquids and calories (e.g. DM solutions) are normally not considered necessary for healthy newborns. However, a preventive way of thinking in modern neonatology justifies a more generous attitude toward fluid supplements. It is better to prevent than to treat dehydration and hypoglycaemia in babies at risk [9]. Furthermore, giving some liquids is an opportunity to calm an infant who is still hungry and crying after breastfeeding when lactogenesis is still insufficient. To prohibit this approach would only be justified if such a practice would jeopardize successful breast-feeding. Our study could not show any negative effect of a more liberal policy for fluid supplements. Admittedly, contrary to the original intention of the study design, a relatively high percentage of infants in the UNICEF group received additional fluids. In fact, only the number of fluid supplements given was significantly lower than in the standard group. The study therefore rather tests whether giving supplements per spoon and cup versus bottle makes a difference.

Our observation suggests that the addition of fluid supplements during the first days of life is rooted in the mothering pattern of our population. This behavioural pattern can also be observed in other cultures [10]. Our observations are consistent with those of other prospective studies which also show that supplemental feeding in the 1st week does not interfere with successful breastfeeding [5, 8, 11, 19].

Step 9 (artificial teats)

The background for this recommendation is concern over "nipple confusion" where infants develop sucking difficulties upon getting an artificial nipple (teats, nipple shields or pacifiers) [17]. In developing countries hygiene issues are also important. As an alternative to bottle feeding, feeding with a cup or a spoon is encouraged. Cup feeding appears to be well accepted by premature babies, but in our experience, often creates problems in term babies [14]. Perhaps this is due to developmental changes in the sucking pattern. Moreover, cup feeding is only possible if the infant is quiet. Supplemental fluids, however, are mainly given to calm a crying baby.

There is some evidence in the literature that the use of a pacifier in the first months of life can shorten the breastfeeding period [1, 21, 24]. Unfortunately, none of these studies were randomized. Our results show that

bottlefeeding with or without the use of a pacifier has no influence on sucking behaviour during the first 5 days of life nor on breastfeeding prevalence and duration in the first 6 months of life.

The use of pacifiers is a common practice in our population as evidenced by a high rate of protocol violations in infants of highly motivated mothers randomized to the UNICEF group. Prohibition of pacifier use is difficult and would only be justified if it had a significant impact on breastfeeding rates. Perhaps our method of randomizing subjects in the same room or ward rather than comparing routines of one ward to another as in the study of Gray-Donald et al contributed to the high dropout rate [8].

Optimal support of parents, early breastfeeding and rooming-in lead to a high percentage of infants being breastfed. In our study population fluid supplements offered by bottle with or without the use of pacifiers during the first 5 days of life were not associated with a lower prevalence or shorter duration of breastfeeding during the first 6 months of life. We would therefore suggest that hospitals which offer optimal and effective breastfeeding promotion be considered as ''baby friendly'', even if there is no strict adherence to steps 6 and 9.

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