Ad libitum or demand/semi-demand feeding versus scheduled interval feeding for preterm infants

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An updated version of this systematic review has been published and can be found online at www.cochrane.org. We will soon update the below RHL summary to reflect the updated findings of the systematic review.

Infants in the ad libitum or demand/semi-demand feeding group had a shorter duration of hospital stay compared with those in the scheduled feeding group, but weight gain in both groups was similar. None of the studies in the review were from under-resourced settings, where staff resources are generally inadequate to implement on-demand feeding. Hence, for such settings, presently there is insufficient evidence to determine whether feeding preterm infants in response to their hunger cues is better than feeding them at pre-specified intervals.

RHL Commentary by Deorari AK and Sankar MJ

1. INTRODUCTION

Preterm infants have immature neuromuscular and gastrointestinal systems, and this poses numerous challenges in their feeding. Unlike term infants, who are able to breastfeed from birth, most preterm infants need to be fed either by alternative methods (cup, spoon, etc.) or by intragastric tube during the first few weeks of life (1). The timing and frequency of such feeds are usually determined by health-care providers rather than by the infants themselves.

Ad libitum or demand/semi-demand feeding, as opposed to scheduled feeding, aims to respond to the hunger cues of the infant (2). Such feeding strategies, in which an enteral feed starts in response to the infant’s cues and ends when the infant demonstrates satiation (or when a prescribed volume of intake is reached) are considered part of “developmentally supportive care” of preterm infants. Since the feeding schedule is dictated by the infant, these methods can potentially promote infant-determined sleeping/waking patterns and increase the total nutrient intake, thereby increasing growth rates (3). The potential adverse effects of these strategies include under/over feeding, metabolic disturbances such as hypoglycemia, and feed intolerance and necrotizing enterocolitis.

The main objective of this review was to assess the effect on growth rates and time to hospital discharge of a policy of feeding preterm infants on an ad libitum or demand/semi-demand basis versus feeding prescribed
2. METHODS OF THE REVIEW

Randomized/quasi-randomized controlled trials and cluster randomized trials that enrolled orally-fed preterm infants and randomized them to receive either ad libitum/demand/semi-demand feeding or scheduled interval feeding were eligible for inclusion in the review. Crossover studies that assessed the use of the two feeding strategies in the same infant and trials in which the type of milk was a co-intervention were not eligible for inclusion. Primary outcomes of the review were: (i) growth parameters including weight gain, length, and head circumference; and (ii) duration of hospital admission. Secondary outcomes were age at full oral feeding, nutrient intake during the trial period, duration of breastfeeding, milk aspiration, hypoglycemia, and feed intolerance and necrotizing enterocolitis.

The standard Cochrane Neonatal Collaborative Review Group search strategy was used and the authors searched MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), as well as the Cumulative Index to Nursing and Allied Health Literature (CINAHL). The authors also searched previous reviews for cross-references and conference and symposia proceedings. The literature search was last updated on 22 December 2009.

The criteria and standard methods of the Cochrane Neonatal Review Group were used to assess independently the methodological quality of the included trials in terms of allocation concealment, blinding of parents or caregivers and assessors to intervention, and completeness of assessment in all randomized individuals. Data were extracted independently by the authors and then compared and differences resolved. Categorical data were analysed by calculating the relative risk (RR), risk difference (RD) and number needed to treat (NNT). Continuous data were analysed by calculating weighted mean difference (WMD) with 95% confidence interval (CI).

The methods used by the authors to conduct the literature search, extract data from eligible studies, assess the quality of included studies, and analyse data and present the findings were appropriate.

3. RESULTS OF THE REVIEW

Eight trials with a total of 496 infants fulfilled the review inclusion criteria. All of the included studies were undertaken in neonatal units in North America. Of the eight included trials, five had compared ad libitum feeding with scheduled interval feeding, while the other three had compared demand/semi-demand feeding with scheduled feeding. In general, the trials were small. The participants in all the trials were clinically stable preterm infants who were fully fed enterally and were at a transition stage from intragastric tube feeds to oral feeds (generally between 32 and 36 weeks’ postmenstrual age). Most of the trials had specifically excluded infants who were small for gestational age at birth and infants with congenital anomalies, or gastrointestinal or neurological problems. Most trials had assessed only short-term outcomes, principally volume and calorie intake and growth parameters (usually weight) during the study period. The duration of the study period was less than seven days in six trials.

With regard to the primary outcomes, four trials that had compared ad libitum feeding with scheduled interval feeding reported the rate of weight gain during the trial period. Meta-analysis of two of these studies with complete data did not detect a statistically significantly difference between the two groups (WMD ?0.9; 95% CI ?2.4 to 0.6 g/kg/day). As to the age at discharge from hospital, meta-analysis of data from the two trials found a statistically significantly lower postmenstrual age at discharge in the intervention group: MD ?0.48; 95% CI ?0.94 to ?0.01 weeks. Among the three trials that had compared demand/semi-demand feeding with scheduled feeding, two studies did not find a significant difference in weight gain between the two groups. With regard to age at discharge from hospital, one study reported a statistically significantly lower postmenstrual age at discharge in infants in the intervention group, while the other did not find any
significant difference between the two groups. Meta-analysis of the data from these studies could not be performed because of differences in study design and in the way the findings were reported.

For the secondary outcomes, three of the included trials reported that ad libitum or demand/semi-demand feeding shortened the duration of the transition phase from tube to full oral feeds when compared with scheduled feeding. There was no significant difference in nutrient intake (daily volume of milk intake) between the intervention (ad libitum or demand/semi-demand feeding) and the control groups. No data were available for other secondary outcomes.

4. DISCUSSION

4.1 Applicability of the results

The results of this review indicate that infants in the ad libitum or demand/semi-demand feeding group have a shorter duration of hospital stay (by about 3 days) compared with those in the scheduled feeding group, but weight gain in both groups is similar. As the review authors point out, the positive effect of ad libitum or demand/semi-demand feeding on hospital stay should be interpreted with caution because of the use of non-nutritive sucking, which is known to reduce the duration of hospital stay in preterm infants, as a co-intervention in one of the studies. Hence, presently there is insufficient evidence to determine whether feeding preterm infants in response to their own hunger cues is better than feeding them at pre-specified intervals.

None of the studies included in the review were from under-resourced settings. The fact that small-for-gestational age infants were excluded from most of the included studies further reduces the generalizability of this review. Unlike in developed countries, fetal growth restriction rather than by prematurity often contributes to low birth weight (LBW) in developing countries (5). A small, LBW infant being fed by alternative methods in a developing country is more likely to exhibit feeding cues when compared with another infant of the same birth weight but born at an earlier gestational age in a developed country. It is therefore essential to evaluate the ad libitum or demand feeding strategy in these mature infants first.

4.2 Implementation of the intervention

If proved beneficial in future trials, ad libitum or demand/semi-demand feeding might prove to be difficult to implement in most under-resourced settings across the world. One requires an ideal nurse–baby ratio in the intensive care unit or special care nursery in order to look actively for the hunger cues of each admitted infant. In developing countries with limited human resources in health-care facilities (6), such a strategy could prove to be counterproductive with infants having slower rate of growth and longer hospital stay, unless efforts are made to employ additional health-care personnel.

4.3 Implications for research

Further large randomized controlled trials are needed to determine if ad libitum or demand/semi-demand feeding of preterm infants affects clinically important outcomes. Such trials should focus on both extremely premature as well as mature, small-for-gestational age infants and should be of sufficient duration to assess the effects on growth and time to discharge from the hospital.

References


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