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Original Article

The effect of an early oral stimulation program on oral feeding of preterm infants

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ABSTRACT

Purpose: To evaluate the effect of an oral stimulation program on preterm infants.
Methods: Preterm infants ($n = 72$) were randomly assigned to experimental and control groups. Controls ($n = 36$) received routine care while the experimental group ($n = 36$) received oral stimulation in addition to routine care. Postmenstrual age, total intake volume, body weight, the transition time from initiation of oral feeding to full oral feeding and feeding efficiency were calculated.
Results: Postmenstrual age and full oral feeding weight were significantly lower in the experimental group ($p < 0.05$). The time from initiation of oral feeding to full oral feeding was significantly shorter in the experimental group ($p < 0.05$) while feeding efficiency was higher in the experimental group ($p < 0.05$) compared to controls. No significant differences existed in hospital stay length or weight gain rate.
Conclusions: An early oral stimulation program is beneficial in preterm infants.

1. Introduction

Due to their underdeveloped central nervous system and oral musculature, preterm infants frequently experience oral feeding difficulties, with coordination lacking for the suck-swallow-breath mechanism [1,2]. Preterm infants rely on administered feedings and parenteral nutrition to ensure proper nutritional requirements are met. Adverse effects, however, are increased due to the lack of stimuli from the gastrointestinal tract [3–5]. Safe and successful suckle feeding, via breast or by bottle, is one requirement for hospital discharge and an ultimate goal for preterm infant feeding [6]. Thus, facilitating oral feeding skills and helping preterm infants transit to full oral feeding are a key focus for the medical staff of neonatal intensive care units (NICUs).

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Table 1 – Baseline characteristics of preterm infants in the experimental and control groups ($\bar{x}$ ± SD).

Characteristic	Experimental group ($n = 32$)	Control group ($n = 31$)	Statistic value	p Value
GA (weeks)	30.87 ± 1.47	30.92 ± 1.48	−0.146[a]	0.885
Weight (g)	1597.38 ± 264.263	1652.50 ± 327.468	−0.983[a]	0.329
Sex				
Male	16	16	0.016[b]	0.549
Female	16	15		
1 min Apgar score	7.78 ± 2.324	7.38 ± 2.420	0.685[a]	0.496
5 min Apgar score	8.55 ± 1.929	8.45 ± 1.997	0.194[a]	0.847

GA: gestational age.
[a] t Value.
[b] χ^2 Value.

Early oral motor interventions (OMIs) are beneficial for oral feeding in preterm infants. OMI is defined as sensory stimulation of the lips, jaw, tongue, soft palate, pharynx, larynx and respiratory muscles, which are thought to influence the physiological underpinnings of the oropharyngeal mechanism in order to improve its functions. Previous research abroad has shown that OMI can shorten the transition time from gavage feeding to full oral feeding and improve oral feeding efficiency [7]. There is no research domestically, however, to evaluate the effects of early OMI. The purpose of this study was to evaluate the effect of an early oral stimulation program on oral feeding in preterm infants to better inform clinical treatment of preterm infants.

2. Methods

2.1. Participants

This study was a randomized controlled trial and was conducted at a level three NICU in the Children's Hospital of Fudan University (Shanghai, People's Republic of China) from November 2011 to May 2012. Infants were enrolled if they were: (1) born between 29 and 34 weeks gestational age (GA) as determined by obstetric ultrasonogram and clinical examination; (2) received all feedings through a tube; (3) stable vital signs; (4) without congenital anomalies or severe complications. The following exclusion criteria were applied: (1) infants with medical complications, such as grade III or IV intraventricular hemorrhage or periventricular leukomalacia; (2) congenital diseases such as chromosomal or genetic abnormalities, neurological abnormalities, complex congenital heart disease, congenital gastrointestinal malformations or bronchopulmonary dysplasia; (3) severe asphyxia; (4) severe infections; (5) severely undersized for GA; (6) other serious complications such as necrotizing enterocolitis (NEC). Informed parental consent was obtained before participants' entry into the study.

Seventy-two preterm infants were randomly assigned into the experimental group or the control group using computer-generated random number assignment. Briefly, the sample size was numbered from 1 to 72 using the random number generator feature in Microsoft Excel. Infants that received numbers 1–36 were assigned to the experimental group while infants receiving numbers 37–72 were assigned to the control group. The order of the allocation sequence was saved and sealed in an envelope; the researchers opened the envelope and recorded groups when infants met the inclusion criteria and after parental informed consent was obtained.

Of the 72 participants enrolled, four withdrew from treatment, one was transferred to another hospital, two were found to have a congenital heart defects and thus were transferred to other department and two developed NEC. Thus, 63 infants completed the study, with 32 patients in the experimental group and 31 in the control group. All participants had statistically similar baseline characteristics (Table 1). No differences were observed with respect to GA, birth weight, sex, 1 min Apgar score and 5 min Apgar score ($p > 0.05$) (Table 1).

2.2. Interventions

The experimental group received the exact oral stimulation program developed by Fucile [8] et al., which consisted of 12 min of oral stimulation and 3 min of non-nutritive sucking (explicit details of which can be found in Table 1 of Fucile [8] et al.).

The interventions started 48 h after discontinuation of nasal continuous positive airway pressure, and were continued until the newborn began an exclusively oral diet. The oral stimulation program was administered once a day 15–30 min before the beginning of a scheduled feeding. Interventions were not administered in the case of medical instability, decreased oxygen saturation, proven apnea or bradycardia.

The control group received routine feeding care administered by the NICU. The doctor prescribed an appropriate milk volume according to gastric function, GA, etc. The infant was fed once every two hours and a supporting position was used during the feeding process in order to avoid the limitations from the neck and shoulder musculature. If necessary, the nurses pulled out the pacifier 3 to 5 times during the feeding sessions to allow the preterm infants to rest.

2.3. Outcome measures

The oral feeding progression was measured as the difference in oral feeding progression time between the experimental and control groups. The initiation of oral feeding was defined as the first oral feeding (≥5 mL/each time). Independent oral feeding was defined as the point at which the nasogastric tube was removed for 48 h and all milk volume per day was taken