RESEARCH PAPER

Oromotor Stimulation for Transition from Gavage to Full Oral Feeding in Preterm Neonates: *A Randomized controlled trial*

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Objective: To assess the effect of additional oromotor stimulation along with routine care on transition from gavage to full oral feeding in preterm neonates.

Method: 51 neonates (28-34 weeks) randomized to receive either oromotor stimulation along with routine care (*n*=25, intervention), or routine care alone (*n*=26, control) (which included Kangaroo mother care and non-nutritive sucking).

Results: Median (IQR) days to reach partial and full spoon feed were significantly lesser [5(3-9.5) *vs* 10(5-15) *P*=0.006; and 7(5-14.5) *vs* 12.5(7-21); *P=0.03*] in intervention than in control group, respectively. A significantly higher number (56%) in intervention group as compared to control group (31%) achieved partial direct breast feeding at discharge (*P*=0.01).

Conclusion: Oromotor stimulation along with routine care reduces the duration of gavage feeding in preterm neonates.

Keywords: *Kangaroo mother care, Non-nutritive sucking, Oromotor stimulation..*

In preterm neonates, optimal breast feeding is limited due to several reasons e.g, illnesses, gut immaturity and inadequate suck, swallow and breathing coordination due to poor oromotor skills [1]. Many research studies show [2,3] that sensorimotor interventions are used to improve oral feeding in preterm babies which provide direct, targeted input to the oral structures involved in feeding. Recent studies [2,4,5] suggest that oromotor stimulation (OMS) programme (peri- and intra-oral stimulation, with or without non-nutritive sucking) applied to preterm infants during gavage feeding can improve sucking abilities and reduces transition period from gavage to full oral feeding, and improves the sucking pattern [6,7]. OMS and non-nutritive sucking (NNS) also increase the probability of more preterm babies being breastfed at discharge [8]. In the present study, we tested the hypothesis that OMS in addition to NNS and Kangaroo mother care (KMC) will be more effective in reaching early oral feeding and direct breast feeding when compared with NNS alone.

Methods

This was a randomized controlled pilot study conducted in a level III neonatal unit over four months. The study was approved by the Institute's research ethics committee. Inborn babies between 28-34 weeks of gestation born consecutively, and admitted to neonatal unit who were hemodynamically stable, reached full gavage feeding and in transition from gavage to spoon feeds, receiving non-nutritive sucking and KMC as routine care were eligible for the study. Babies having respiratory distress, on continuous positive airway pressure /Ventilator and having congenital malformations were excluded.

Eligible babies were randomized by using computer generated random numbers after obtaining written informed consent from parents and received either OMS along with routine care in the intervention group or routine Care alone (NNS and KMC) in the control group. Concealment of allocation was achieved by creating sequentially numbered sealed opaque envelopes that were opened by the principal investigator (not blinded) to assign intervention group.

Mother was trained by principal investigator how to do OMS several times till she was confident. OMS was practiced by mother five times a day before each feed, till discharge or till full direct breast feed was achieved. Hand hygiene was taught to mother extensively. OMS consisted of five steps, *i.e*., stroking cheeks, lips, jaw and tongue, and rubbing gums [2]. During the study period, mother was observed daily at least once per day during OMS. Control group was given only NNS and KMC. NNS was performed before each feed and KMC was practiced for 3-4 hours per day in both the groups.

Baseline demographic characteristics and previous morbidities were recorded at enrolment. Assessment of

feeding was done initially at enrolment and then every fifth day till discharge or full breast feed during hospital stay. Time taken to reach partial/full spoon feed, and partial/full breast feed were recorded. Partial spoon feed was defined as accepting nearly 50% of the total volume of milk by spoon and 50% by orogastric tube during each feed, and 1-2 full spoon feeds in a day. Partial breast feed was defined as when baby was accepting full breast feed for 5-6 times a day and rest of the feeds by spoon. Feeding efficacy was assessed by volume of total spoon feed intake (ml/kg/feed) and spoon feed intake rate per minute (mL/minute).

The primary outcome was to compare transition time from full gavage feed to partial and full spoon feed. Secondary outcomes were to assess total volume of milk by spoon at each feed and time required to complete full spoon feed and partial direct breast feed at discharge.

A sample size of convenience of 51 was planned due to time constraints. Independent *t* test or Mann-Whitney U test and chi square and Fisher's exact test were used. A *P* value <0.05 was considered significant.

RESULTS

The base line characteristics and morbidities of the two groups were similar (***Table* I**). The median transition time (d) to reach partial spoon feed and full spoon feed were significantly less in intervention group as compared to control group (***Table* II).** A significantly (*P*<0.01) higher number of babies in intervention group were discharged on partial direct breast feed and spoon feed as compared to control group. No significant inter-group difference was seen in other outcome variables like sucking pattern, number of jaw movements/min and swallowing movements/min. The mean spoon feed intake (mL/kg/per feed) and spoon feed ingestion rate (mL/min) were higher at each assessment in intervention (12-16 mL/kg and 0.9-1.4 mL/min) as compared to control group (10-12 mL/kg and 0.8-1 mL/min), though statistically not significant. No harms or unintended effects like desaturation, aspiration, apnea, hypothermia, bradycardia, or infection were observed.

TABLE I BASELINE CHARACTERISTICS AND MORBIDITIES OF THE STUDY POPULATION

Variables, mean (SD)	*Intervention (n=25)*	*Control (n=26)*
Gestational age (wk)	30.9 (1.7)	30.3 (1.5)
Birth weight (g)	1285 (283)	1212 (323)
Age at enrolment (d), median (IQR)	11 (8.5-14.5)	11.5 (8-17)
Post conceptional age at enrolment (wk)	32.7 (1.6)	32.4 (1.3)
Weight at enrolment (g)	1242 (250)	1215 (277)
Oro-gastric feed started, d (of life)	2.7 (2.3)	2.4 (1.6)
Full oro-gastric feed achieved, d (of life)	9.2 (3.6)	10.8 (6.2)
Male, *n* (%)	10 (40)	16 (61)
Sepsis, *n* (%)	18 (72)	15 (60)
Culture-positive, *n* (%)	6 (24)	10 (38)
Hyaline membrane disease, *n* (%)	13 (52)	15 (58)
Ventilation, *n* (%)	15 (60)	16 (61)
Noninvasive ventilation, *n* (%)	11 (73)	15 (94)

TABLE II TRANSITION TIME FROM GAVAGE FEEDING AND FEEDING MODE AT DISCHARGE

	Transition time (d), Median (IQR)		
Feeding method	*Intervention, n=25*	*Control, n=26*	*P value*
Partial spoon feed	5 (3-9.5)	10 (5-15)	0.006
Full spoon feed	7 (5-14.5)	12.5 (7-21)	0.03
Partial breast feed	13 (7-25)	10 (6-15)	0.32
Feeding mode at discharge, n (%)			
Partial breast/spoon feed	14 (56)	8 (31)	0.01
Only spoon feed	10 (40)	18 (69)	0.03

WHAT THIS STUDY ADDS

- Oromotor stimulation in addition to non-nutritive sucking and Kangaroo mother care is more effective in reducing transition time from gavage to oral feeding as compared to these two interventions alone among stable preterms of around 30 weeks gestational age.

DISCUSSION

This randomized controlled trial showed that when additional OMS is combined with routine existing practices of KMC and NNS, it further improves feeding abilities in preterm babies. Spoon-feeding was achieved earlier in the intervention group as well as significantly higher number of babies were on partial breast feed at discharge.

A limitation of the study was small sample size due to time constraints. Intervention and assessment could not be blinded due to its nature. Though the mother was trained to do OMS, all the sessions could not be monitored. The effect of intervention on attaining full breast feed also could not be elicited as we discharged babies early due to infrastructure constraints. A large multicentric study with a longer follow up is required to confirm the effects found in this pilot study.

Non-nutritive sucking alone positively benefits the feeding pattern of neonates by achieving earlier oral feeds and shorter hospital stay [9]. The statistically non-significant improvement in volume and time for spoon feeding could be due to the fact that our control group was also receiving NNS which also improves oral feeding performance. Oro-motor stimulation program increases the overall daily milk intake and milk transfer rate in addition to early transition from gavage to spoon feed and also improve sucking pattern of preterm babies [10]. Pre-feeding oral stimulation group attains independent oral feeding faster and has consistently greater overall intake and rate of milk transfer when compared with only sham-stimulation group [11]. When non-nutritive sucking is added to oral stimulation it contributes to the improvement of breastfeeding rates among preterm infants [8]. All these findings were quite similar to our observations.

This study shows that it can be practiced in all stable preterm neonates even in moderate preterm with positive effects.

Contributors: PB: helped in study design, collected and analysed the data and drafted the manuscript; RK: supervised data collection and reviewed the manuscript; KM: conceptualized and designed the study, helped in data analysis and critically reviewed the manuscript; SK: cross checked the data and helped in review of literature. All authors approved the manuscript.
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REFERENCES

1. Lau C, Smith EO, Schanler RJ. Coordination of suck-swallow and swallow- respiration in preterm infants. Acta Paediatr. 2006;92:721-7.
2. Hwang YS, Vergara E, Lin CH, Coster WH, Bigsby R, Tsai WH. Effects of pre-feeding oral stimulation on feeding performance of preterm infants. Indian J Pediatr. 2010;77: 869-73.
3. Arvdeson J, Clark H, Lararus C, Schooling T, Frymark T. Evidence-based systematic review (EBSR): The effects of oral motor interventions on feeding and swallowing in preterm infants. Am J Speech-Language Pathol. 2010;19:321-40.
4. Rocha AD, Moreira ME, Pimenta HP, Ramos JR, Lucena SL. A randomized study of the efficacy of sensory motor oral stimulation and non nutritive sucking in very low birth infant. Early Hum Dev. 2007;83:385-8.
5. Fucile S, Gisel EG, Mcfarland DH, Lau C. Oral and non-oral sensorimotor interventions enhance oral feeding performance in preterm infants. Dev Med Child Neurol. 2011; 53:829-35.
6. Gaebler CP, Hanzlik JR. The effect of prefeeding stimulation programme on feeding performance. Am J Occup Therapy. 1996;50:184-92.
7. Karagol BS, Zenciroglu A, Okumus N, Polin RA. Randomized controlled trial of slow *vs* rapid enteral feeding. Advancements on the clinical outcomes of preterm infants with birth weight 750-1250 g. J Parenter Enteral Nutr. 2013;37:223-8.
8. Pimenta HP, Moreira ME, Rocha AD, Gomes SC, Pinto LW, Lucena SL. Non-nutritive sucking and oral stimulation. J Pediatr. 2008; 84:423-27.
9. Harding CM, Law J, Pring T. The use of non-nutritive sucking to promote functional sucking skills in premature infants: An exploratory trial. Infant. 2006;2:238-43. Available from: *www.infantgrapevine.co.uk/pdf/Inf-012-nsp.pdf.* Accessed December 11, 2015.
10. Fucile S, Giesel EG, Lau C. Effect of prefeeding oral stimulation program on sucking skill maturation of preterm infants. Dev Med Child Neurol. 2005; 47:158-62.
11. Fucile S, Gisel E, Lau C. Oral stimulation program accelerates the transition to full oral feedings in preterm infants. J Pediatr. 2002;141:230-6.