

## Comparison of Sucking Pattern in Premature Infants With Different Feeding Methods

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**Objective:** To compare the sucking pattern of preterm infants on different feeding methods.

**Methods:** The sucking behavior on a gloved finger was evaluated for infants receiving breastfeeding, spoon-feeding and tube-feeding.

**Results:** The mean (SD) numbers of sucks in spoon-fed infants [49 (20) vs. 35 (23);  $P=0.04$ ] were significantly higher, and the grade of suck was significantly better compared to the tube-fed group. The mean (SD) number of sucks was significantly higher [83 (30) vs. 49 (20),  $P<0.001$ ] in breastfed infants compared to spoon-fed infants; all infants on breast feeds had grade 2 suction.

**Conclusion:** The sucking behavior varies between tube-fed, spoon-fed, and breastfed preterm infant.

**Keywords:** Infant feeding behavior, Breastfeeding, Neonate, Nutrition.

Learning to feed is a key developmental process for the preterm infant. The coordination of sucking, swallowing, and breathing is largely dependent on post-conception age but may vary from infant to infant [1]. Several tools have been developed to assess sucking behavior [2-4]. We compared the sucking pattern of preterm infants of various gestations and on different methods of feeding by a simple bedside clinical method.

### METHODS

This cross-sectional study was conducted in a tertiary care perinatal center from January 1, 2010 to May 30, 2011. Written informed consent was obtained from the mother, and the study was approved by the Institute ethics committee. All preterm infants tolerating full enteral feeds (150 mL/kg/day) for at least 3 consecutive days were included. Infants with feed intolerance (>50% of pre-feed aspirates, altered aspirates, vomiting or visible abdominal distension) or with hemodynamic instability were excluded. The infants included were categorized into *Group I*: Gestational age 28 to 30 weeks and tolerating tube feeds; *Group II*: Gestational age 31 to 34 weeks and tolerating spoon feeds without any desaturation episodes; and *Group III*: Gestational age from 35 to 36 weeks on exclusive breastfeeds.

All infants were evaluated on 2 separate sessions 6 hours apart, in the pre-feed state (just before the time for

the usual feed), and when they were in state III or state IV Brazilton neurobehavioral state. Evaluation of sucking behavior consisted of 2 minutes of finger (clean gloved) sucking by the infant. During the evaluation, the infant was monitored by a multipara-monitor.

Evaluation included: (a) Number of sucks in the first 2 minutes of the stimulus applied; simultaneous visible contractions of the lips and facial movements were considered as sucks; (b) Total number of bursts during each episode (bursts were 2 or more continuous sucks within a 2 second interval). (c) The average number of sucks per burst; and (d) Grading of negative suction pressure. *Grade 0* was when there was no negative suction and the examiner could easily withdraw his finger. *Grade 1* was mild negative suction where the finger could be withdrawn but with some resistance. *Grade 2* was good negative suction where attempt to withdraw the finger was resisted by the infant. For evaluating the suck-swallow coordination, the vital parameters of the infant including heart rate, breathing pattern and saturations were recorded from the multipara-monitor during the sucking activity. A video recording was also done simultaneously, from which the number of sucks, number of bursts and sucks per burst were evaluated by a person blinded to the feeding method. The superior of the assessment parameter from either visual assessment or from the video recording was considered for inclusion in the study. Both the visual assessment and the assessment

from video recording were done by same team of two investigators.

Sucking behavior between tube-fed and spoon-fed infants, and between spoon-fed and breastfed infants was compared. The outcomes were compared between Group I and Group II and between Group II and Group III.  $P < 0.05$  was considered significant. No *a priori* sample size estimation was done.

## RESULTS

During the study period, 70 infants were enrolled with 24 infants each in Group I and II and 22 infants in Group III. Three infants (12.5%) in Group I had 5 minute Apgar  $< 5$  but none had clinical seizures. Seventeen (71%) and 6 infants in Group I, and 8 (33%) and 1 infant in Group II received nasal CPAP and mechanical ventilation, respectively in the immediate neonatal period. The other clinical and sociodemographic variables were similar in all three groups (**Table I**). None of the infants had apnea or significant desaturation requiring oxygen or respiratory support during assessment.

The mean (SD) numbers of sucks was significantly higher and the grade of suction was better in spoon-fed group compared to tube-fed group ( $P < 0.001$ ). The mean (SD) number of sucks and the number of sucks per burst were significantly higher in breastfed infants compared to spoon-fed infants (**Table II**).

## DISCUSSION

In this study, infants on breast feeds had more number of sucks and better grade of suction compared to infants on spoon feeds, who on the other hand had better grade of suction, more number of sucks and higher maximum number of sucks per burst than infants on tube feeds.

The differences observed could be purely due to gestational maturity of spoon-fed compared to tube-fed, and breast-fed compared to spoon-fed infants. The same neonates were not studied across the three feeding methods as they matured. Also, evaluation was on the gloved finger and not during actual feeding. Consequently, the percentage of sucks in bursts or the actual milk flow and milk intake was not evaluated.

Some studies implicate postmenstrual age for development of sucking behavior, but many others suggest chronological age or sucking experience as predominant factor in promoting mature sucking pattern in preterm infants [5]. Cunha, *et al.* [6] studied the nutritive sucking pattern in 15 very low birth weight infants from preterm to term. They observed that the mean number of sucks increase with gestational age, duration of intervention and chronological age. In our study, infants with higher gestational age had more sucks per burst and a better grade of suction. Many other studies have evaluated complex scoring systems [4] or invasive

**TABLE I** CHARACTERISTICS OF NEONATES IN THE DIFFERENT FEEDING METHOD GROUPS

Characteristic	Tube-fed (n=24)	Spoon-fed (n=24)	Breast-fed (n=24)
Age at assessment (d), mean (SD)	10.1 (3.6)	7.6 (4.4)	3.5 (1.4)
Birth weight (g), mean (SD)	1077 (244)	1280 (231)	1810 (398)
Gestational age (wk), mean (SD)	29.5 (1.98)	31.5 (1.22)	35 (1.02)
Male gender, No. (%)	10 (60)	11 (54.2)	15 (68.2)
Caesarian delivery, No. (%)	22 (91.7)	24 (100)	15 (68.2)
Day of full feeds, mean (SD)	7.5 (2.6)	5.5 (2.7)	—
Small for gestational age, No. (%)	7 (24.3)	5 (20.8)	5 (22.7)

**TABLE II** COMPARISON OF OUTCOMES IN NEONATES ON DIFFERENT FEEDING METHODS

Outcomes	Tube-fed (n=24)	Spoon-fed (n=24)	Breast-fed (n=22)	P value	
				Group I vs. II	Group II vs. III
No. of sucks, mean (SD)	35.5 (23)	49 (20.)	83 (30)	0.04	$< 0.001$
No of sucks, median (IQR)	30 (13-106)	47 (23-110)	83 (40-154)	0.009	$< 0.001$
Sucks per burst, mean (SD)	6 (3)	7 (4)	13 (9)	0.26	0.001
Suction grade: Grade 0	13 (54.2%)	0	0	$< 0.001$	—
Grade 1	8 (33.3%)	14 (58.3%)	0	$< 0.001$	$< 0.001$
Grade 2	3 (12.5%)	10 (41.7%)	22 (100%)	$< 0.001$	$< 0.001$

**WHAT THIS STUDY ADDS?**

- A 2-minute assessment of sucking behavior on a gloved finger differentiates a tube-fed from a spoon-fed and a spoon-fed from a breastfed preterm infant.

or expensive measurement devices to evaluate their sucking pattern [7,8], and to judge the feeding efficiency of premature infants [9]. Most of these studies were on infants on bottle feeds.

The sucking pattern evaluated in this study may serve as a background information for future studies evaluating the ability of preterm infants' transition from one method of feeding to other.

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