

EFFECTS OF NONNUTRITIVE SUCKING STIMULATION WITH GLOVED FINGER ON FEEDING TRANSITION IN VERY LOW BIRTH WEIGHT PREMATURE INFANTS

Efeitos da estimulação da sucção não nutritiva com dedo enluvado na transição alimentar em recém-nascido prematuro de muito baixo peso

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ABSTRACT

Purpose: to analyze the influence of nonnutritive sucking stimulation with the gloved finger technique on readiness and the transition from gastric to oral feeding in very low birthweight premature infants. **Methods:** aleatory, prospective, longitudinal, experimental and controlled study in premature infants attended in intense care units in Hospital de Clínicas, with gestational age \geq 32 weeks and birth weights \geq 1500g, stable clinical. Newborns were randomly distributed in two groups: the control group, without stimulation NNS and the experimental group with stimulation NNS with gloved finger, three time for day, three days in the week. There were measured criteria such as the score of oral feeding readiness evaluation, stress signs during oral feeding and time of transition from gastric to oral feeding. **Results:** when compared the experimental group with the control group, it was observed a significantly higher score in the preterm infant oral feeding readiness evaluation, lower of signs of stress and a shorter time of transition from gastric to oral feeding. **Conclusion:** the NNS stimulation with the gloved finger technique, improved preterm infant oral feeding readiness, reduced stress signals frequency while oral feeding and influenced the time of feeding transition in the experimental group when compared to the control group.

KEYWORDS: Infant, Premature; Suction; Breast Feeding

■ INTRODUCTION

The interest in detecting and preventing developmental disorders in premature infants, in whom birth complications impose risk of transitory or permanent developmental disorders, has intensified over the past years. This has promoted a multidisciplinary approach, which lead to a comprehensive and humane care for the infant, in order to favor the global development and the quality of life of the patient, his/her mother and the entire family¹.

Upon instituting the Stork Network, the Brazilian Ministry of Health has secured and strengthened a comprehensive care to the newborn at risk, based on principles of quality and humanized care, such as good practices of breastfeeding support and large investments in maternity hospitals which are reference in the country, guaranteeing Neonatal Intensive Care Unit (NICU) beds and Kangaroo beds².

Preterm infants with gestational age below 28 weeks have been showing increasing survival, despite the forced development of their nervous system under non-physiological and frequently adverse conditions³. For this population, in addition to the gastrointestinal maturity, the synchrony between sucking, swallowing and breathing is essential for successful oral feeding^{4,5}.

When compared with term infants, breastfeeding of preterm babies is more difficult to be established and maintained. This may be explained

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by a prolonged separation between mother and infant, inadequate management by breastfeeding support professionals, difficulties in establishing and maintaining the production of breast milk due to maternal anxiety and stress, maternal insecurities regarding the quality of the breast milk, immature feeding behavior of the preterm infant (mainly those with birth weight below 1500 g or below 32 weeks of gestational age), and by the influence of the method used to transition to oral feeds⁴⁻⁶.

Nonnutritive sucking (NNS) has been shown to be beneficial by minimizing the sensorial deprivation and preparing the preterm infant for early, safe and effective oral feeding^{7,8}. Performing NNS stimulation before feeding allows the preterm infant to achieve an appropriate behavioral state and to be able to organize and coordinate the sucking movements⁷⁻⁹.

Very low weight preterm newborns frequently present difficulty in establishing the feeding function. It is believed that the stimulation of the NNS can improve the readiness of these infants to an earlier safe and effective feeding.

Therefore, the aim of this study was to analyze the effects of NNS stimulation with the gloved finger technique on the establishment and transition from gastric to oral feeding in very low weight preterm infants.

METHODS

This study was approved by the Committee on Ethics in Human Research at Hospital de Clínicas da Universidade Federal do Paraná, registered with the number 1426.091/2007-05. It has been characterized as a randomized, prospective, longitudinal, experimental and controlled study.

The cohort was selected from preterm infants admitted to the NICU of Hospital de Clínicas da Universidade Federal do Paraná, a teaching hospital, between July 2007 and March 2008.

The inclusion criteria consisted of birth weight ≥ 1500 g, gestational age at birth ≤ 32 weeks, 5-minute Apgar score above 6, clinical (respiratory and hemodynamic) stability on enrollment and during the study, initiation of enteral feeding by oral or nasogastric tube associated or not with parenteral nutrition, and Free and Informed Consent Form signed by the parents. We excluded patients with grades III/IV intraventricular hemorrhage, clinical instability on enrollment or during the study, including necrotizing enterocolitis, sepsis, bronchopulmonary dysplasia and other clinical respiratory or hemodynamic instabilities, 5-minute Apgar below 5, presence of genetic syndromes, neurological disorders, as well as head, neck or central nervous system congenital malformations. Oral disorders

were not considered as exclusion criteria, since the sucking function in this population is immature due to the infant's own condition when compared with term infants; its development should occur through maturity and experience¹⁰.

The newborns were randomly and equally distributed into two groups: Experimental Group (EG), comprised of infants who received a 10-minute NNS stimulation with a gloved finger before feeding, three times a day, thrice a week, with the newborn on a supine, semiflexed position receiving perioral and oral stimulation¹¹ and the Control Group (CG), which included infants who did not receive NNS stimulation.

To start receiving oral feeding, the newborns underwent evaluation with an instrument to assess readiness to commence suck feeds in preterm infants. We considered the infant ready to start nutritive sucking (NS) when he/she had achieved a score above 28 points¹².

For preterm infants who were ready to start oral feeding, we offered 05 mL of human breast milk to observe whether signs of distress would occur during NS.

During the feeding transition phase, the nursing team was in charge of offering the milk and collecting information regarding the feeding transition period, starting from the beginning of oral feeding simultaneously to the feeding via gastric tube, until the gastric tube was totally removed. The removal of the tube followed routine criteria of the NICU, such as effective breastfeeding or total oral acceptance of the offered volume in the absence of the mother. The speech and language therapist conducting the research supervised all newborns during breastfeeding until discharge.

The data were entered in an electronic spreadsheet (Microsoft Excel®), checked and exported to the software Statistica®. The difference between continuous variables was assessed by Student's *t* test, Mann-Whitney and Anova for repetitive measures, with minimal significance level set at 5%.

RESULTS

During the study, 122 preterm infants with very low birth weight were admitted to the NICU of a public teaching hospital in Paraná. Of these, 47 newborns were excluded due to the occurrence of bronchopulmonary dysplasia ($n=8$), sepsis ($n=3$), respiratory or hemodynamic instability on enrollment or during the study ($n=28$), intraventricular hemorrhage grades 3 or 4 ($n=3$), necrotizing enterocolitis ($n=4$) and 5-minute Apgar below 5 ($n=1$). Thirty five newborns died before enrollment in the study. The final cohort was comprised of 40 newborns (20

females) randomly and equally distributed in groups CG and EG.

Mean maternal age was 26.3 ± 8.4 years in the CG group and 24.3 ± 5.7 years in the EG group. Both groups had similar rates of maternal obstetric complications, including hypertensive disorders of pregnancy, maternal-related preterm labor, premature rupture of membranes, preterm labor of unknown cause and placental abruption.

Gestational age and birth weight on study inclusion were also similar between both groups, showing that both cohorts were equally distributed on enrollment (Table 1).

In terms of establishment and transition of the feeding, the scores on the instrument to assess readiness to commence suck feeds were significantly lower in the CG when compared with the EG. Also, the time to transition from gastric to oral feeding was significantly lower in the EG versus the CG. There was no statistically significant difference between groups in rates of exclusive maternal breastfeeding on hospital discharge (Table 2).

As for the occurrence of distress signals during NS, we observed that they were more frequent in the CG when compared with the EG. The most frequent distress signals were tongue tremor, chest indrawing, chocking and changes in skin color (Table 3).

Table 1 - Gestational age and birth weight according to the studied group

	Control group (n = 20)	Experimental group (n = 20)	p
Gestacional age (weeks)	29.9 ± 1.6	30.1 ± 1.3	0.79
Birth weight (grams)	1256.5 ± 238.7	1306.7 ± 167.8	0.44

Student's t test
p < 0.05

Table 2 – Feeding transition according to the studied group

	Control group (CG) (n = 20)	Experimental group (EG) (n = 20)	Min. CG/ EG	Max. CG/ EG	p
Score on readiness assessment	30.7 ± 1.4	32.8 ± 1.0	28 / 31	34 / 34	0.001
Transition time to oral feeding	5 days	3 days	2 / 2 days	8 / 5 days	0.001
Exclusively maternal breastfeeding*	65%	75%	-	-	0.41

Mann-Whitney test
*Pearson's chi-square test
p < 0.05

Table 3 – Occurrence of distress signals

	Control group (n=20)	Experimental group (n=20)	p
Occurrence of distress signals	50%	20%	0.04
Tongue tremor†	5	3	-
Chest indrawing†	4	4	-
Chocking†	3	1	-
Changes in skin color†	3	-	-

Pearson's chi-square test
†Most frequent signs
p < 0.05

■ DISCUSSION

The presence of a speech and language therapist in the NICU is no longer restricted to isolate cases, but have rather expanded to preventive interventions directed towards the preterm infant aiming at stimulating and initiating early oral feeding. The increase in the number of scientific studies in this challenging area has confirmed with satisfactory results the importance of a multidisciplinary approach towards the earliest possible start and continuation of breastfeeding.

In this study, the NNS stimulation accelerated the transition from gastric to oral feeding, and seemed to facilitate the development of sucking movements, reflected by the neurobehavioral maturation and organization of the preterm infant and corroborating the findings from other studies^{7-9,11-13}.

The technique used for NNS stimulation in our study is comparable to the one applied in another study which suggests the use of a gloved finger to enhance the sensibility to the intraoral movements of the preterm infant, allowing a more functional stimulation¹¹, and preventing the use of nipples for stimulation, strengthening public policies of promoting, protecting and supporting breastfeeding.

As for the evaluation of readiness to feed orally, our study showed that the NNS stimulation favored a previous sucking experience and influenced positively the newborns towards aspects of behavioral organization, providing a better oral feeding performance¹³⁻²¹.

The use of a validated and reliable instrument to objectively assess readiness to initiate oral feeds^{6,12, 22} brings confidence to the health team, since it determines with precision the best moment to initiate the transition, with the advantage of using an evaluation that encompasses factors such as maturity, posture and global tonus, posture and oral reflexes, and motor abilities²².

Another relevant result demonstrated in this study was the time of transition from gastric to oral feeding, which was significantly shorter in the EG (3 days) when compared with the CG (5 days). Similar results have been reported in other studies¹⁵⁻²⁴.

Premature newborns are often unable to integrate the sensorial stimulation due to the immaturity of the nervous system and present some signs indicating their limits, which are called distress signals¹¹. Newborns in the CG presented an increased frequency of these distress signals when compared with those in the EG. These results may have occurred because the infants in the EG had improved readiness for oral feeding and better physiological stability during NS since they were exposed to sensorimotor oral stimulation²⁵. In contrast, the

occurrence of a higher frequency of distress signals in the CG may have occurred due to lack of previous experience¹³ and better organization of the sucking pattern⁸⁻²⁶.

The NNS associated with oral stimulation and the way in which the milk is offered may contribute to improve the rates of maternal breastfeeding⁹. In our study, there was no difference in the rates of exclusive maternal breastfeeding between groups on hospital discharge.

Considering the population analyzed in our study, with the presence of neonatal disorders associated with prematurity and the factors that hinder the success of breastfeeding such as maternal stress and separation between mother/infant, we observed that the rate of exclusive maternal breastfeeding in both groups on discharge was high. This finding strengthens the idea that the intervention, not only from the speech and language therapist, but from the health team as a whole on the work with the mother, the infant and the family in all processes of recovery of the child, and due to the care policies offered by the Clinical Hospital, which is a Child-Friendly Hospital, helped the success of the breastfeeding. This finding is similar to that of a study that observed a higher rate of maternal breastfeeding in preterm infants when compared with term infants, explained by the work conducted by the multidisciplinary team that assisted the premature infants, their mothers and family members, offering orientation and support necessary for maternal breastfeeding²⁷.

In the NICU of a teaching hospital, it is routine to use a cup to transition feeding in newborns who do not present physical and behavioral criteria to make this transition directly to the maternal breast.

We chose the NNS technique using a gloved finger and syringe to evaluate the NS and to make the feeding transition in our study, with this population of premature infants, with the aim of observing the use of this alternative method. Although applied in many NICUs, this is a controversial method since the technique lacks proper clarification. This research did not aim at evaluating the method itself, but we found that there is need for more studies about the use of alternative methods of feeding transition for preterm infants who are unable to directly breastfeed.

In this study, we hypothesized that the suck of the finger with the syringe would be the closest possible model to the physiological pattern, not influencing negatively the success of the maternal breastfeeding, since this is a population that needs functional oral stimulation, apart from the need to have their diet offered in a secure and effective way. We also relied on the perception of the method by the team, since it is recognized the importance of

the support of all the professionals who care for the binomial mother/infant, for a conscious use of the alternative method of feeding aiming primarily at stimulating sucking and adjusting the oral patterns for establishing exclusive maternal breastfeeding as early as possible.

Conducting this study and reviewing others allowed us to verify the benefits of the NNS stimulation on the establishment and transition to oral feeding in the preterm infant, and to corroborate that the use of a validated instrument with adequate reliability to evaluate the readiness to initiate

oral feeding makes the assistance of low weight newborns more secure and effective both for the infant, as well as for the health team.

■ CONCLUSION

The NNS stimulation using a gloved finger in premature newborns improved the readiness to initiate oral feeding, reduced the frequency of distress during NS and reduced the time to transition to oral feeds in the EG when compared with the CG.

RESUMO

Objetivos: analisar os efeitos da estimulação da sucção não nutritiva com a técnica do dedo enluvado, sobre o início e a transição alimentar da via gástrica para a via oral em prematuros de muito baixo peso. **Métodos:** estudo aleatório, prospectivo, longitudinal, experimental e controlado, que incluiu 40 prematuros internados na UTI Neonatal do Hospital de Clínicas, com idade gestacional \leq 32 semanas e peso de nascimento \leq 1500g, clinicamente estáveis. Os prematuros foram distribuídos aleatoriamente, por meio de sorteio, em 2 grupos: grupo controle, sem SNN e grupo experimental, com SNN com dedo enluvado, 3 vezes ao dia, 3 dias na semana. Foram avaliados critérios quanto ao escore da avaliação da prontidão para início da alimentação oral, intercorrências durante a sucção nutritiva (SN) e o tempo de transição alimentar. **Resultados:** quando comparado o grupo experimental em relação ao grupo controle observou-se um escore significativamente maior na avaliação da prontidão para início da alimentação via oral, uma menor frequência de sinais de estresse durante a sucção nutritiva e um menor tempo de transição alimentar da via gástrica para via oral. **Conclusão:** a estimulação da sucção não nutritiva com a técnica do dedo enluvado melhorou a prontidão do prematuro para início da alimentação via oral, diminuiu a frequência dos sinais de estresse durante a alimentação via oral e reduziu o tempo de transição alimentar no grupo experimental quando comparado ao grupo controle.

DESCRITORES: Prematuro; Sucção; Aleitamento Materno

■ REFERENCES

1. Caetano LC, Fujinaga CI, Scochi CGS. Sucção não nutritiva em bebês prematuros: estudo bibliográfico. *Rev Latinoam Enferm*. 2003;11:232-6.
2. BRASIL. Ministério da Saúde. Portal da Saúde. Rede Cegonha. Manual prático para a implementação da Rede Cegonha. Brasília, 2013. Disponível em: www.saude.mt.gov.br/arquivo/3062. Acesso em: 24/06/2013.
3. Kenner C, Diaz PF, Valdebenito MR. The transition from tube to nipple in the premature newborn. *Newborn and Infant Nursing Reviews*. 2007;7(2):114-9.
4. Aquino RR, Osório MM. Alimentação do recém-nascido pré-termo: métodos alternativos de transição da gavagem para o peito materno. *Rev Bras Saúde Matern Infant*. 2008;8(1):11-6.
5. Lau C, Smith EO, Schanler RJ. Coordination of suck-swallow and swallow-respiration in preterm infants. *Acta Paediatr*. 2003;92:721-7.
6. Scochi GS, Gauy JS, Fujinaga CI, Fonseca LMM, Zamberlan NE. Transição alimentar por via oral em prematuros de um hospital amigo da criança. *Acta Paul Enferm*. 2010;23(4):540-5.
7. Fucile S, Gisel EG, Lau C. Effect of an oral stimulation program on sucking skill maturation of preterm infants. *Dev Med Child Neurol*. 2005;47:158-62.
8. Neiva FCB, Leone CR. Sucção em recém-nascidos pré-termo e estimulação da sucção. *Pró-fono R Atual. Cient*. 2006;18(2):141-50.

9. Pimenta HP, Moreira MEL, Rocha AD, Gomes Junior SC, Pinto LW, Lucena SL. Efeitos da sucção não nutritiva e da estimulação oral nas taxas de amamentação em recém-nascidos pré-termos de muito baixo peso ao nascer: um ensaio clínico randomizado. *J. Pediatr.* 2008;84(5):423-7.
10. Fujinaga CI, Duca AP, Petroni RACL, Rosa CH. Indicações e uso da técnica "sonda-dedo". *Rev CEFAC.* 2012;14(4):721-4.
11. Neiva FCB. Análise evolutiva do padrão de sucção e da influência da estimulação através da sucção não-nutritiva em recém-nascidos pré-termo. [Tese]. São Paulo (SP):Faculdade de Medicina, Universidade de São Paulo; 2003.
12. Fujinaga CI, Zamberlan NE, Rodarte MDO, Scochi CGS. Reliability of an instrument to assess the readiness of preterm infants for oral feeding (original title: Confiabilidade do instrumento de avaliação da prontidão do prematuro para alimentação oral). *Pró-fono R Atual. Cient.* 2007;19(2):143-50.
13. Pickler RH, Frankel HB, Walsh KM, Thompson NM. Effects of nonnutritive sucking on behavioral organization and feeding performance in preterm infants. *Nurs Res.* 1996;45:132-5.
14. Yu M, Chen Y. The effects of nonnutritive sucking on behavioral state and feeding in premature infants before feeding. *Nurs Res.* 1999;7:468-78.
15. McCain GC, Gartside PSP, Greenberg J M, Lott JW. A feeding protocol for health preterm infants that shortens time to oral feeding. *J Pediatr.* 2001;139(3):374-9.
16. Pinelli J, Symington A. Non-nutritive sucking for promotion physiologic stability and nutrition in preterm infants. *Cochrane Database Syst Rev.* 2001;(3):Cd001071.[atualizada em 2005 Oct 19;(4);acesso em 2008 Oct 23]
17. Disponível em <http://www.ncbi.nlm.nih.gov/pubmed/16235279>
18. Neiva FCB, Leone CR. Efeitos da estimulação da sucção não-nutritiva na idade de início da alimentação via oral em recém-nascidos pré-termo. *Rev Paul Pediatr.* 2007;25(2):129-34.
19. Mattes RD, Maone T, Wager-Page S, Beauchamp J, Bernbaum J, Stallings V *et al.* Effects on sweet taste stimulation on growth and sucking in preterm infants. *J Obstet Gynecol Neonatal Nurs.* 1996;25:407-14.
20. Rocha AD, Moreira MEL, Pimenta HP, Ramos JRM, Lucena SL. A randomized study of the efficacy of sensory-motor-oral stimulation and nonnutritive sucking in very low birthweight infant. *Early Hum Dev.* 2007;83:385-8.
21. Calado DFB, Souza R. Intervenção fonoaudiológica em recém-nascido pré-termo: estimulação oromotora e sucção não-nutritiva. *Rev. CEFAC.* 2012; 14(1):176-81
22. Moura LTL, Tolentino GM, Costa TLS, Aline A. Atuação fonoaudiológica na estimulação precoce da sucção não-nutritiva em recém-nascidos pré-termo. *Rev CEFAC.* 2009;11(Supl3):448-56.
23. Fujinaga CI, Scochi CGS, Santos CB, Zamberlan NE, Leite AM. Validação do conteúdo de um instrumento para avaliação da prontidão do prematuro para início da alimentação oral. *Rev. Bras. Saude Mater. Infant.* 2008;8(4):391-9.
24. Sehgal SK, Prakash O, Gupta A, Mohan M Anand NK. Evaluation of beneficial effects of nonnutritive sucking in preterm infants. *Indian Pediatr.* 1990;27:263-6.
25. Bauer MA. Condições fonoaudiológicas, taxa de transferência e competência alimentar de recém-nascidos prematuros na liberação da via oral. [Monografia]. Santa Maria (RS): Universidade Federal de Santa Maria; 2006.
26. Costa PP, Ruedell AM, Weinmann ARM, Keske-Soares M. Influência da estimulação sensório-motora-oral em recém-nascidos pré-termo. *Rev. CEFAC.* 2011;13(4):599-606.
27. Case-Smith J, Cooper P, Scala V. Feeding efficiency of premature neonates. *Am J Occup Ther.* 1989;43:245-50.
28. Silva WF, Guedes ZCF. Tempo de aleitamento materno exclusivo em recém-nascidos prematuros e a termo. *Rev. CEFAC.* 2012. ahead of print.

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