Medica Hospitalia
Journal of Clinical Medicine
Med Hosp 2024; vol 11 (3) : 240–245

OPEN ACCESS

*Original Article*

# The Effect of Feeding Process Stimulation on Oral Preparedness Readiness in Premature Infants

Endah Dessirya[1], Herlina[1], Wahyuni[2], Iin Pusparini[1], Mustaqimah[1], Dewi Hayati[1]

[1]Cipto Mangunkusumo National Hospital
[2]University of Pembangunan Nasional Veteran Jakarta, Indonesia

p-ISSN: 2301-4369 e-ISSN: 2685-7898
https://doi.org/10.36408/mhjcm.v11i3.1097

**Accepted:** March 04th, 2024
**Approved:** September 24th, 2024

**Author Affiliation:**
Cipto Mangunkusumo National Hospital, Indonesia

**Author Correspondence:**
Dewi Hayati
Pangeran Diponegoro Street No. 71,
DKI Jakarta 10430, Indonesia

**E-mail:**
sinurse.nursinglearning@gmail.com



## Abstract

**Background :** Most preterm infants do not have proper sucking, swallowing, and breathing coordination which caused delay in oral feeding readiness. The objective of this study was to analyze the influence of feeding stimulation on the readiness of premature infant's oral feeding.
**Methods :** This study was a true experimental study that involved 44 preterm infants born between 32–34 weeks of gestational age, devided in two groups. Twenty two infants in the intervention group received positioning (mid-line control symmetric) and oral feeding stimulation, while the control group received only positioning intervention. Oral stimulation was given 8 times a day for 7 days, before starting the oral feeding program. Oral feeding readiness was measured by using a modified early feeding scale (EFS) instrument on the first and the seventh days. Data analysis using t-test dependent, independent t-test, and Mc Nemar test.
**Results :** The results showed that there was a significant effect of the intervention on EFS score ($p$ <0.001) and also on preterm infant's oral feeding readiness ($p$ = 0.002). The results also showed that there was an effect of intervention on the length of stay ($p$=0.001).
**Conclusion :** Early oral feeding stimulation improves the infant's oral feeding readiness and shortens the infant's length of stay. Researchers recommend stimulation of the feeding process as an independent nursing intervention in caring for premature infants.

**Keywords :** Lenght of stay, oral feeding stimulation, oral feeding readiness, preterm infant

## INTRODUCTION

A Preterm infant is an infant born alive at 37 weeks gestational age or pregnancy.[1] The immature gestational age causes various malfunction and poor coordination between body systems. This condition may threat premature infant life, therefore, premature infants required special care.[2]

A new concept of special care for premature infant is developmental care.[3] Spesial control care in infants may aid the infant's external environment to resemble the infant's internal environment related nesting and flexion positions. Developmental care has both short and long-term impacts. Short-term effects of developmental care shorten the use of endotracheal tubes thus rapid extubation, and long-term effects may support children's development.[2] The extubation gives the opportunity for oral feeding in infant. Premature infants are usually experience many problems including hypothermia, respiratory distress syndrome, intracranial hemorrhage, hyperbilirubinemia and hypoglycemia due to weak suctioning power lead inadequate intake.[4]

Oral feeding in premature infants are complex process. Oral feeding requires good coordination between the nervous and oral motor systems be able to suck, swallow, and breathe at the same time. A problem that often arises in premature infants are the immaturity of the respiratory and oral motor central nervous systems. Clinical manifestations of the problem of oral feeding can be in the form of three symptoms: aspiration, regurgitation, and desaturation.[5] Premature infants who experience desaturation are in difficult situations that can be life-threatening. Oral motor stimulation can increase the power of sucking premature infants, thereby reducing the risk of aspiration and desaturation.[6]

Premature infant care in the perinatology ward at Dr. Cipto Mangunkusumo National General Hospital has implemented positioning and oral motor stimulation in the expectation the premature infant' oral drinking readiness will be better. Good drinking readiness is one indicator of the infant's readiness to return home. Infant who are not ready to drink will be referred to the Medical Rehabilitation Unit for medical rehabilitation measures. Some of these premature infants have problems in readiness to drink orally. Based on medical record from Cipto Mangunkusumo Hospital, the data showed that 885 premature babies were treated in the perinatology ward. Some of these premature babies had issues with oral feeding readiness. A total of 231 premature babies (26.1%) were referred to the URM due to problems with feeding readiness.

This data shows that there is still a problem with premature infant' readiness to drink, even though they have received standard oral motor stimulation treatment. Thus, the objective of this study is to analyze whether there is an influence of stimulation of the feeding process on the readiness to drink orally in premature infant.

## METHODS

The research was a true experimental study. This research obtained approval and was ethically reviewed by the Faculty of Nursing, University of Indonesia, with the number: 329/UN2.F1/ETIK/2017. This study consisted of two groups: an intervention group and a control group. Subjects were divided into an intervention group and a control group. The intervention group received stimulation feeding process (oromotor stimulation and positioning), while the control group received standard care consisting of positioning. In the intervention group, the EFS assessment was conducted initially before the feeding process stimulation and after the feeding process stimulation on the 7$^{th}$ day. In the control group, the EFS assessment was conducted before and after the standard oromotor stimulation. The difference in oral feeding readiness of premature babies before and after the intervention in both the intervention and control groups was then analyzed.

The target population of this study is all premature infants. The populations were premature infants who were treated in the Perinatology ward and respondents were obtained using a randomized sampling technique. Samples in this study are 50 premature infants, 25 were intervention group and 25 were control group. Data collection for this study was conducted in 2017. Given the rapid advancements in health science and the potential for changes in clinical practice, it is important to assess whether the findings from 2017 remain relevant for reference in 2024. Although the data continues to be utilized as the standard operating procedure at RSCM, it is recommended to review recent literature and updates in clinical guidelines to confirm that the 2017 results still hold true and are applicable in the current context. The length of the day of care is calculated from the time the infant first enters the treatment room until the infant leaves the hospital and goes home. Statistical analysis was performed using an independent t-test.

The intervention was carried out for 7 days. The intervention was carried out for 7 days according to the study conducted by Lesson which recommends promoter stimulation for premature babies.[1] Oral stimulation program improved oromotor skills and growth rate in premature babies aged 28–32 weeks.[7] There was a reduction in the transition time from tube feeding to oral feeding. Another study that oromotor stimulation before feeding can improve feeding performance, shorten hospital stays for premature neonates, and increase breastfeeding rates.[8]

Premature infant's drink preparation can be assessed objectively with various instruments, one of which is the assessment of early feeding skills for premature infant (EFS). EFS assesses the infant's

readiness and drinks tolerance as well as the development of the infant's drink skills. EFS is a checklist sheet that can be filled out by nurses or mothers who have premature infant. This research was conducted in the Perinatology Room at Dr Cipto Mangunkusumo National Hospital. Statistical analysis will use the McNemar and Chi Squre tests.

## RESULTS

The characteristics of the intervention group and the control group consisting of age, gender, and weight of the infant was presented in Table 1.

Based on the Table 1, the average age in both intervention and control group were 32.8 weeks. In the intervention group, there were 9 males (40.9%), and in the control group, there are 12 males (54.5%). The average birth weight in the intervention group was 1565.7 kg, and in the control group, was 1587.7 kg.

After the intervention in seven days, we assessment the EFS score in first day for pre test and in seventh day for post-test. Table 2 showed there were differences in EFS scores before and after intervention in the intervention group ($p = 0.006$).

Table 3 showed that there was no significant difference in EFS scores before and after the intervention in the control group ($p = 0.71$). After comparing the average EFS scores on the seventh day between the intervention group and the control group, the analysis results indicated that there was no significant difference.

There was a significant effect of the feeding process on the readiness for oral feeding in preterm infants ($p = 0.001$). The mean EFS score showed a mean difference of 0.74, with a 95% confidence interval ranging from 3.89 to 6.93 points (t = 7.261).

Table 5 showed that there was an effect of stimulation of the researchers classify the value of EFS scores into two categories. The researchers categorized ready to feeding infants if the EFS scores was .>10 and the infant was not ready to feeding if the EFS score was <10. The result Table 5 of the analysis showed that there was a statistically significant effect of the stimulation of the feeding process on oral readiness for feeding in preterm infants ($p = 0.002$).

TABLE 1
**Characteristic of respondents**

| Characteristic of Respondents | Group | |
|---|---|---|
| | Intervention (n=22) | Control (n=22) |
| Age (week); mean ± deviation standard | 32.8 ± 1.2 | 32.8 ± 1.3 |
| Gender, n (%) | | |
| Male | 9 (40.9) | 12 (54.5) |
| Female | 13 (59.1) | 10 (45.5) |
| Birth weight (in gram): mean± Deviation standard | 1565.7 ± 394.9 | 1587.7 ± 365.9 |

TABLE 2
**Difference of EFS score in intervention group before and after treatment**

| Variabel | *Mean* (SD) | t | *p* |
|---|---|---|---|
| EFS Score | 3.45 (5.32) | -3.05 | 0.006 |

TABLE 3
**Difference EFS score in control group**
**The Effect of Feeding Process for the Readiness of Oral Feeding in Preterm Infants**

| Variabel | *Mean* (SD) | t | *p* |
|---|---|---|---|
| EFS Score | -0.27 (3.35) | -0.381 | 0.71 |

TABLE 4
**Difference EFS score in intervention group and control group**
**The Effect of Feeding Process for the Readiness of Oral Feeding in Preterm Infants**

| Variabel | *Mean* (SD) | *Mean Difference* (95%CI) | t | *p* |
|---|---|---|---|---|
| EFS Score | – | 0.74 (3.89 – 6.93) | 7.261 | 0.001 |

TABLE 5
**The Effect of Feeding Process for the Readiness of Oral Feeding in Preterm Infants**

| Oral feeding readiness before intervention | Oral feeding readiness after Intervention | | Total | *P* |
|---|---|---|---|---|
| | Ready | Not Ready | | |
| Ready | 17 | 0 | 17 | 0.002* |
| Not Ready | 10 | 17 | 27 | |
| Total | 27 | 17 | 44 | |

TABLE 6
**The Effect of Stimulation of The feeding on The Length of Care for Premature Infants**

| Variabel | | *Mean* | *Standard Deviation* | t | *p* |
|---|---|---|---|---|---|
| EFS Score | Intervention | 3.45 | 2 | 7.261 | <0.0001* |
| | Control | 0.27 | 3.35 | | |
| Length of stay | Intervention | 21.7 | 9.4 | 3.5 | 0.001* |
| | Control | 33.9 | – | | |

The analysis showed there are differences in mean length of stay (LOS) or length of days treatment for preterm infants who received stimulation of the feeding process with premature infants who received standard care. The result of the analysis is shown in Table 6.

The result showed that there was a difference in feeding stimulation on the length of stay of preterm infants ($p$ = 0.001). Early oral feeding stimulation improves the infant's oral feeding readiness and shorten the infant's length of stay.

## DISCUSSION

There was a significant difference in oral feeding ability in premature infants aged less than three weeks and four weeks with premature infants over thirty-four weeks.[6] The ability to coordinate breathing at the time of feeding is fully achieved at the age of thirty-six weeks. Feeding ability includes the ability to coordinate breathing by swallowing. Good feeding ability shows readiness to feeding per oral infant. Oromotor stimulation before feeding can improve feeding performance, shorten hospital stays for premature neonates, and increase breastfeeding rates.[8] The appropriate positioning is the first step when the infant is ready to start the process of oral feeding. Appropriate position during oral feeding initiation is to maintain the midline control position. This midline position is the physiological position of the fetus in the uterus so that the infant becomes more comfortable.[9] The infant's comfort will support the infant to focus more on his motor movements. The infant's dissection in the flexion and midline position can reduce the gross motor movement of the infant so that the infant becomes more focused on fine motor activities namely sucking, swallowing, and breathing.

The rapid increase in feeding readiness was seen in one of the intervention group respondents. EFS score before receiving feeding stimulation shows a score of 0. A score of 0 illustrates the condition of a infant who does not have good oral motor muscle strength so the infant unable to suck properly. Infants do not have enough energy, so in one burst they cannot produce a short

suction of more than seven suction. Infants also seem to stop sucking and preparing their breath before sucking again which indicates that the infant has not been able to coordinate the breathing process, sucking and swallowing at one time. The EFS 0 score shows that the infant is not ready for oral feeding. Infant's EFS score after seven days of stimulation of the feeding process changes. The EFS score becomes 10 from the score of 0. The infant has been able to maintain the strength of the oral motor muscle to suck and push the liquid to swallow together with the breathing process. The EFS 10 score shows the infant is ready for oral feeding.

Oral motor intervention can improve feeding readiness per oral premature infant.[10] Massage in the perioral area can remind the infant to suck and push the tongue in motion for feeding. Stimulation of the muscles in the perioral area helps infant strengthen muscle strength thereby increasing their suction ability. A strong tongue pushes the fluid towards the back to improve the ability to swallow premature infants. The midline position maintained by dissection helps the infant concentrate on fine and respiratory motor movements. This combination of sucking power, ability to swallow, and ability to maintain breathing is what increases the readiness of feeding per oral premature infant.[11] Oral stimulation impacts the oral structures as a crucial component in the oral stimulation program and can enhance the strength of the oral muscles for effective sucking. Oral stimulation using a pacifier (non-nutritive sucking) as another component of this program can also improve the efficiency and endurance of the oral structures in the sucking process. Overall, this program can enhance the maturity of the central or peripheral nervous system structures, improve sucking ability, and coordinate the sucking-swallowing-breathing process.[12]

Oral motor intervention or oral stimulation is defined as sensory stimulation on the lips, jaw, tongue, soft palate, pharynx, larynx, and respiratory muscles that affect the oropharyngeal mechanism. Sensory stimulation on these oral structures can enhance the ability of the oral structures in the sucking and swallowing processes.

The combination of positioning and oral motor stimulation was used to intervene in preterm infants in the intervention group while infants in the control group received intervention in the form of treatments that became the standard treatment procedure in the room, and the combination was called feeding as stimulation process. The results showed that infants who were fed stimulation were more ready to feed than infants who did not receive stimulation of the feeding process.

Readiness to feeding premature infants supports adequate nutritional intake so that enough energy to improve health status. The infant's health status is well characterized by good clinical and weight gain. Infants with good health status will be allowed to go home so that their health status is related to the length of stay. The results showed a mean difference in length of stay between preterm infants who received stimulation of the feeding process with infants who received standard room care (21.7 + 9.4 vs 33.9 + 13.4). The results showed that there was a stimulation effect on the feeding process for the length of stay ($p$ = 0.001). Infants who get a feeding process are 12.2 days faster than infants who receive standard room care.

The length of stay for infant who received oral motor stimulation was 2.6 days shorter than infant who did not receive oral motor stimulation. Oral motor stimulation which part of the stimulation of the feeding process helps strengthen the oral motor muscles and comfort the infant so that the infant is able to strengthen the strength of suction and the swallowing-breathing process. This condition benefits the infant due to nutrition is better and energy needs are sufficient. Energy is stored in the form of fat reserves that can be stored.

## Limitations

The results showed that there was an effect of stimulation of the feeding process on readiness to feeding per oral premature infant. The research did not examine the progress of the volume of feeding per oral infant. The Research examined body weight as the final result of the progress of oral feeding.

## CONCLUSION

Oral feeding in premature infants is a complex task because it requires good coordination between sucking, swallowing, and breathing simultaneously. This study shows a statistically significant effect of feeding process stimulation on oral feeding readiness in premature infants, but the researchers faced a limitation in not measuring the progress in oral feeding volume. Researchers recommend that future studies investigate the effect of feeding process stimulation on the progress of oral feeding in premature infants.

## REFERENCES

1. Gargari SS, Kashanian M, Zendedel H, Nayeri F, Shariat M, Hagholahi F. Survival and risk factors of extremely preterm babies (< 28 weeks) in the three iranian hospitals. Acta Medica Iranica. 2018;56(3):181–8.
2. Pickler RH, McGrath JM, Reyna BA, McCain N, Lewis M, Cone S, *et al*. A Model of Neurodevelopmental Risk and Protection for Preterm Infants. Advances in Neonatal Care. 2013 Oct;13(5S):S11–20.
3. Jepkosgei K, Ongeso A, Omuga B. Perceived Demographic and Socio-Economic Factors Contributing to Poor Outcome of Neonatal Sepsis at Paediatric Unit Kenyatta National Hospital. East African Journal of Health and Science. 2021 Oct 18;4(1):16–23.
4. Utami R, Gunawan IMA, Aritonang I. Pengaruh Pemberian

Makanan Tambahan (PMT) Pemulihan terhadap Status Gizi pada Ibu Hamil di Kabupaten Sleman. JURNAL NUTRISIA. 2018 Mar 1;20(1):19–26.
5. Beluska-Turkan K, Korczak R, Hartell B, Moskal K, Maukonen J, Alexander DE, *et al*. Nutritional gaps and supplementation in the first 1000 days. Nutrients. 2019;11(12):1–50.
6. Bertoncelli N, Cuomo G, Cattani S, Mazzi C, Pugliese M, Coccolini E, *et al*. Oral Feeding Competences of Healthy Preterm Infants : A Review. 2012;2012.
7. Arora K, Goel S, Manerkar S, Konde N, Panchal H, Hegde D, *et al*. Prefeeding Oromotor Stimulation Program for Improving Oromotor Function in Preterm Infants – A Randomized Controlled Trial. Indian Pediatr. 2018 Aug 20;55(8):675–8.
8. Sasmal S, Shetty AP, Saha B, Knoll B, Mukherjee S. Effect of Prefeeding Oromotor Stimulation on Oral Feeding Performance of Preterm Neonates during Hospitalization and at Corrected One Month of Age at a Tertiary Neonatal Care Unit of India: A Randomized Controlled Trial. Journal of Neonatology. 2023 Jun 9;37(2):149–58.
9. Lubbe W. Clinicians guide for cue based transition to oral feeding in preterm infants: An easy to use clinical guide. J Eval Clin Pract. 2018 Feb 2;24(1):80–8.
10. Tian X, Yi LJ, Zhang L, Zhou JG, Ma L, Ou YX, *et al*. Oral Motor Intervention Improved the Oral Feeding in Preterm Infants. Medicine. 2015 Aug;94(31):e1310.
11. El Mashad G, El Saied H, Mekawy N. Effect of an early oral stimulation program on oral feeding in preterm neonates. Menoufia Medical Journal. 2021;34(1):226.
12. Asadollahpour F, Yadegari F, Soleimani F, Khalesi N. The Effects of Non-Nutritive Sucking and Pre-Feeding Oral Stimulation on Time to Achieve Independent Oral Feeding for Preterm Infants. Iran J Pediatr. 2015 Jun 27;25(3).