ORIGINAL RESEARCH

A comparative study of the acceptability of nifty cup feeding to Paladai feeding in neonates admitted to NICU

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Abstract
Paladai is a cup used extensively however when improperly practiced, milk is poured into the infants mouth rather than allowing him to lap it and can cause bradycardia, apnea or chocking. It was hypothesized that with NIFTY cup, it would be possible to control the amount of feed being given.
It was a randomized crossover trial conducted in the NICU over 18 months. As no intervention was done and already established practices in the NICU were studied, there was no danger of any unethical practice. All the neonates fulfilling inclusion criteria were included. By randomized cross over trial, neonates were fed initially by NIFTY cup or by the paladai and later by the other method. The caregiver then completed a preference survey comparing their experience with both the feeding methods. The NIFTY cup proved less problematic than the paladai in terms of spilling, regurgitation, gagging, and damage, according to the caregivers. It was easier to use and required less time to feed the baby and the newborn was less agitated when using it. Thus the NIFTY cup is a promising new tool for feeding infants with breastfeeding difficulties. Additional bigger and multicentric studies are needed to evaluate the NIFTY cup.
Key words:NIFTY cup, paladai, feeding cup, breastmilk, breastfeeding, neonate, feeding difficulties, NICU

Introduction

Over 15 million preterm newborns are born each year around the world, along with 2, 73,000 neonates whose mothers pass away during childbirth and 2, 33,000 infants with oral clefts who may have trouble nursing. Most of these births take place in environments with limited resources [1].

For infants who are having trouble latching on to the breast, cup feeding is a secure and reliable technique. In low resource situations, the World Health Organization advises manual expression of breast milk and cup feeding for infants who cannot be breastfed.

The advantages of nursing have long been understood. Breastfeeding education is now considered a top health priority. A variety of factors, including those related to demographics, biophysics, society, culture, and psychology, have an impact on breastfeeding habits and attitudes [2].

For the first six months, starting the first hour after birth, the WHO advises exclusively nursing to meet the infant's nutritional needs and promote optimal growth, development, and health. In order to satisfy the changing demands of the developing baby, it is advisable that the mother continue breastfeeding for at least two years and introduce nutritionally adequate, secure, and appropriately-fed complementary foods at the age of six months. WHO promotes these recommendations through a number of programs, including the International Breastfeeding Code and the Baby Friendly Hospital Initiative (BFHI) [3].

Newborn babies receive the best and most complete nourishment from breastfeeding, and the health concerns of infant formula feeding are becoming well understood. Breastfeeding protects against infectious diseases during infancy, and also has long-term advantages in a number of areas, including reduced risk of cardiovascular disease, increased intelligence, and allergies.

A comprehensive, multi-pronged, evidence-based plan to address child under-nutrition is urgently required. There are evidence-based interventions available to prevent under-nutrition in children and to increase child survival, including starting breastfeeding within an hour of birth, breastfeeding exclusively for the first six months of life, and introducing appropriate and adequate complementary food after this time. Breastfeeding also enhances women's health by reducing postpartum hemorrhage, cancer incidence, and bone fractures as they age [4].

It is well established that socioeconomic and demographic factors have a different impact on breastfeeding onset and duration than do other parameters. According to studies, attributes including greater maternal education levels, income levels, and quitting smoking are linked to higher rates of breastfeeding. A child's growth and development are most influenced by the first two years of life. Any harm brought on by nutritional deficits during this time could result in hampered cognitive growth, hampered academic performance, and low economic production [5].

In various situations, a number of variables have been linked to less-than-ideal breastfeeding and supplemental feeding habits. These include maternal traits like age, marital status, occupation, and level of education; antenatal and maternity health care; health education and media exposure; socioeconomic status and area of residence; and traits of the child such birth weight, delivery mode, birth order, and pacifier use [6].

Methodology

Study design: Randomized crossover trial.

Study period: 18 months.

Sample size: 100 sample.

Inclusion criteria

1. All preterm infants admitted to NICU in KIMS hospital, Bangalore
2. All term infants who were clinically indicated to cup or paladai feed at the time of enrollment.

Exclusion criteria

- Neonates born with major congenital anomalies and birth defects in whom feeding is contraindicated.
- Neonates whose attenders have not given a written informed consent
- Written informed consent was taken.
- Caregivers used both the NIFTY cup and the paladai to feed the infants.
- Consistent with a crossover design, the caregiver and infant were randomized to which intervention to receive first (NIFTY cup or the Paladai).
- NIFTY cup was provided by the investigator.
- The caregiver was taught and demonstrated how to use the assigned feeding cup and was provided sufficient time to use the cup at least twice before the first feeding assessment.
- Feeding assessment was then conducted with the first cup.
- Then the caregiver was provided with the second cup, taught and demonstrated how to use that cup and was provided sufficient time to use the second cup at least twice before the feeding assessment.
- Feeding assessment was then conducted with the second cup. NIFTY cup / paladai was used till the neonate is able to directly breastfeed.
- The caregiver then completed a preference survey comparing their experience with both the cups including answering questions on spillage, regurgitation, duration of a feed, difficulty to do, infant gagging, infant irritability, insufficient intake, injury, and cleaning.
- Responses were recorded on a scale ranging from 1-5 where 5 was “very satisfied” and 0 was “very unsatisfied”.

Results

Table 1: Comparison of responses on the regurgitation after feeding using the feeding cups

Caregivers response score	For nifty cup	For Paladai
5	62	6
4	31	32
3	7	47
2	0	15
1	0	0

In terms of duration of feeding on using the feeding cups, the care givers response on the Likert scale is given in table 2. The average response on the Likert scale for the NIFTY cup was 4.59 which was much higher than that for paladai (3.95) which was statistically significant (p value < 0.0001).

Table 2: Comparison of responses on the duration of feeding using the feeding cups

Caregivers response score	For nifty cup	For Paladai
5	64	22
4	31	51
3	5	27
2	0	0
1	0	0

Moving onto the difficulties experienced during feeding by the cups, the caregiver's response on the Likert scale is given in table 3. The caregivers again preferred the NIFTY cup over the paladai as the average response on the Likert scale for the NIFTY cup was 4.56 which was much higher than that for paladai (3.12) which was statistically significant (p value < 0.0001).

Table 3: Comparison of responses on the difficulties experienced during feeding using the feeding cups

Caregivers response score	For nifty cup	For Paladai
5	68	6
4	20	27
3	12	40
2	0	27
1	0	0

Next in terms of the infant gagging during feeding by the cups, the caregiver's response on the Likert scale is given in table 4. The caregivers again preferred the NIFTY cup over the paladai as the average response on the Likert scale for the NIFTY cup was 4.57 which was much higher than that for paladai (3.55) which was statistically significant (p value < 0.0001).

Table 4: Comparison of responses on infant gagging during feeding using the feeding cups

Caregivers response score	For nifty cup	For Paladai
5	64	7
4	29	41
3	7	52
2	0	0
1	0	0

Moving on in terms of the infant irritability during feeding by the cups, the caregiver's response on the Likert scale is given in table 5. The caregivers again preferred the NIFTY cup over the paladai as the average response on the Likert scale for the NIFTY cup was 4.5 which was much higher than that for paladai (3.6) which was statistically significant (p value < 0.0001).

Table 5: Comparison of responses on infant irritability during feeding using the feeding cups

Caregivers response score	For nifty cup	For Paladai
5	57	6
4	36	48
3	7	46
2	0	0
1	0	0

Next in terms of the sufficient intake during feeding by the cups, the caregiver's response on the Likert scale is given in table 6. The caregivers again preferred the NIFTY cup over the paladai as the average response on the Likert scale for the NIFTY cup was 4.72 which was much higher than that for paladai (3.73) which was statistically significant (p value < 0.0001).

Table 6: Comparison of responses on sufficient intake during feeding using the feeding cups

Caregivers response score	For nifty cup	For Paladai
5	74	11
4	25	51
3	0	38
2	0	0
1	1	0

In terms of the injury caused to the baby's mouth during feeding by the cups, the caregivers response on the Likert scale is given in table 7. The caregivers again preferred the NIFTY cup over the paladai in terms of less injury caused while feeding as the average response on the Likert scale for the NIFTY cup was 4.91 which was much higher than that for paladai (3.03) which was statistically significant (p value < 0.0001).

Table 7: Comparison of responses on injury caused during feeding using the feeding cups

Caregivers response score	For Nifty Cup	For Paladai
5	91	5
4	9	16
3	0	57
2	0	21
1	0	1

In terms of the ease of cleaning the feeding cups after feeds, the caregiver's response on the Likert scale is given in table 8. The caregivers again preferred the NIFTY cup over the paladai as the easier cup to clean as the average response on the Likert scale for the NIFTY cup was 3.92 which was much higher than that for paladai (3.35) which was statistically significant (p value < 0.0001).

Table 8: Comparison of responses on the ease of cleaning the feeding cups after feeding

Caregivers response score	For nifty cup	For Paladai
5	15	6
4	62	32
3	21	47
2	1	15
1	1	0

Based on the response to the overall preferred feeding cup by the caregivers, the responses were highly inclined towards the NIFTY cup (95% responses) as compared to the paladai (5% responses).

On comparing the caregiver's experiences with the NIFTY cup and the paladai, the NIFTY cup ranked better in all aspects.

Discussion

The NIFTY cup was easier to use and caregivers agreed that insufficient intake was less of a problem than with the paladai. Given its size and capacity of 40 mL, the NIFTY cup can feed a preterm infant completely in one cup, whereas the 10 ml paladai probably needs to be refilled multiple times. Additionally, the paladai may be more difficult to use than the NIFTY cup because it requires substantial feeder skill to prevent milk from spilling or flooding the infant. The fact that the NIFTY cup wasn't as difficult to use as the paladai and that very few HCPs were concerned about not getting enough milk suggests that the cup is well-designed to quickly provide adequate intake. This is especially important because, according to a review of the literature conducted by the authors, cup feeding frequently results in insufficient intake [7].

It is interesting that more participants reported hand-expressing breast milk into the NIFTY cup than the medium cup, despite the fact that hand expression was not discussed or the focus of our intervention. This is probably because of the larger volume size and design of the NIFTY cup. It was designed to be comfortable to use with one hand to express breastmilk, allowing mothers to express enough milk for the next feeding without having to transfer their expressed milk to another container. Although a Cochrane review found no connection between hand expression or pump and bacterial contamination, their conclusion was based on one study in Malaysia and one in the United States. In the Malaysian study, bacterial contamination with a pump, but not hand expression, increased statistically significantly in the home setting, but there was no difference in the hospital setting. Tools that support hand expression, like the NIFTY cup, could be useful given that many mothers in low-resource settings are discharged from the hospital while still providing supplemental feeds. Additionally, there is evidence to suggest that expressing one's hands can be a potent tool for facilitating breast milk supply and the transition to exclusively breastfeeding, particularly in the context of relaxation. As a result, the increased use of the NIFTY cup for hand expression may indicate that its use allowed mothers to express the feeding experience in a more relaxed and positive manner [8].

The NIFTY cup was thought by caregivers to have a shorter feeding time than the paladai. This is promising, but it will need to be investigated objectively due to the importance of newborn feeding frequency and duration. Preterm infants may tune out or fall asleep before taking in sufficient volume, and prolonged feedings can result in an excessive expenditure of energy for the feeding. Infants with oral clefts have been known to become exhausted before they finish feeding. The findings of this study indicate that the NIFTY cup can satisfy these feeding requirements, although additional research is required.

The ideal feeding is a brief one with sufficient intake [9].

The fact that regurgitation and gagging were less of a problem with the NIFTY cup than they were with the Paladai suggests that the NIFTY cup offers a better feeding experience. The NIFTY cup did not receive many injury reports. The majority of paladai are made of metal, which can occasionally be rough or sharp enough to cut an infant's slip. The long beak can be inserted too deeply into the mouth by a novice or untrained feeder, increasing the risk of injury, particularly in premature infants whose mouth skin is delicate. The NIFTY cup's soft silicone construction prevents it from chafing or cutting an infant's mouth. The cup won't get too far into the mouth and injure anyone because its reservoir is rectangular rather than pointed and has a shallow depth. The NIFTY cup can play a crucial role in maintaining evidence-based care practices for preterm infants, such as kangaroo mother care, due to its overall high acceptability for feeding preterm infants. Continuous skin-to-skin contact to ensure thermostability and other health benefits for the infant, support for exclusive breastfeeding or other appropriate feeding, and early recognition or response to illness and/or discharge when indicated are common components of kangaroo mother care, even though there is currently no global standard definition. Exclusive breastfeeding is frequently not achieved at birth in preterm infants, and infants require ongoing supplemental feeding while they mature and acquire the skills necessary to transition to exclusive breastfeeding. By facilitating exclusive breastfeeding, the NIFTY cup fits into the existing model of care for kangaroo mothers. The World Health Organization's recommendations for supplemental feeding are also compatible with the NIFTY cup [10].

Christy M. McKinney *et al*. also conducted a similar study comparing the NIFTY cup and the Paladai and found that the NIFTY cup was found to be better accepted than the paladai on all aspects except cleaning of the cup. The results of his study are similar to the ones achieved here but in his study only preterms were included, here both term and preterm babies who were indicated for cup feeding were included. This study's strengths include including caregivers in the evaluation of infants with various diagnoses of breastfeeding difficulties. The NIFTY cup should be evaluated in other settings due to the single-site investigation. Because it was a new device, it's possible that caregivers liked the NIFTY cup more. However, if participants had truly believed in the experiences that were reported, it seems unlikely that they would have responded so positively to the NIFTY feeding cup [11, 12].

Conclusion

In terms of injury to the baby's mouth during feeding, the average response on the Likert scale for the NIFTY cup was 4.91 which was much higher than that for paladai (3.03) which was statistically significant (p value < 0.0001).

In terms of ease of cleaning the feeding cups, the average response on the Likert scale for the NIFTY cup was 3.92 which was much higher than that for paladai (3.35) which was statistically significant (p value < 0.0001).

Our findings show that the NIFTY cup can offer an improved feeding experience for the caregiver-infant pair.

The NIFTY cup is thus a promising new tool for feeding infants with breastfeeding difficulties. Additional studies are needed to evaluate the NIFTY cup. It may also be useful to compare the NIFTY cup to other types of cups and to bottle feeding in high resource settings where multiple methods are used as a way of transitioning mother-infant dyads to breastfeeding.

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