



PALADAI AND KATORI-SPOON METHODS FOR FEEDING LOW BIRTH WEIGHT NEONATES – A RANDOMISED CROSS SECTIONAL STUDY

Neonatology

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ABSTRACT

Objective: To compare the two methods (Katori spoon versus Paladai) of alternative oral feeding for low birth weight neonates in terms of weight gain, spillage, time to reach mature breast feeds and complications. Additional objective was to measure mothers' and nurses' satisfaction in administering the two methods of feeds.

Methods: This randomised cross sectional study was conducted over a period of one year in the neonatal intensive care unit (NICU) and post natal wards of Nazareth Hospital, Shillong. The NICU of Nazareth Hospital is a referral unit that has intake of both intramural and extramural births. The NICU offers Level 3 neonatal care.

Results: 96 neonates who were more than 30 weeks post conceptional age and hemodynamically stable were enrolled in 4 groups - Group I: 30wk-31 weeks 6 days PCA, Group II: 32wk-33 weeks 6 days PCA (post-conceptional age), Group III: 34wk -36 weeks 6 days PCA & Group IV: > 37 weeks PCA. Equal number of neonates (24 each) in each group were randomly assigned one of the two method of feeding, i.e katori – spoon and paladai. Therefore, out of the enrolled 96 neonates, 48 were given feeding with paladai and 48 were fed with katori – spoon. All enrolled neonates were fed their own mother's expressed breast milk. Nineteen males and 29 females who received feeding with paladai and 23 males and 25 females received feeding with katori spoon. Of the total neonates enrolled, 64 were intramural birth of whom 33 received paladai feeding and 31 received katori-spoon feeding. Whereas there were 32 enrolled neonates who were not born in Nazareth Hospital of whom 15 received paladai feeding and 17 received spoon feeding. The mean weight gain across all groups (PCA I to IV) was 1.460 kg for the paladai arm and 1.464 kg for the katori-spoon arm. The mean spillage for all groups was 0.629 g in the paladai arm and 0.617 gm in the katori-spoon arm. The mean number of days taken to achieve mature breast feeds was 2.143 days in the paladai arm and 3.182 days in the katori- spoon arm. None of these differences was found to be statistically significant. Complications were negligible for both arms. On analysis of the satisfaction surveys conducted on nurses' and mothers', it was found that mothers found paladai method to be superior to katori-spoon method on several responses such as "I am comfortable with this method of feeding" ($p = 0.022$), "Milk spillage is less with this method" ($p < 0.001$); "Positioning of my baby is better with this method" ($p = 0.001$) and "My baby appears satisfied with this method" ($p = 0.019$)

Conclusion: Paladai method of feeding low birth weight neonates is comparable in all respects to katori – spoon method.

KEYWORDS

Feeding of low birth weight (LBW <2500gms) babies differs from that of normal birth weight babies. These babies require more help and monitoring in terms of feeding and nutrition, in view of limitations that make breast feeding difficult. Alternative methods such as orogastric tube feeds or spoon, cup and paladai feeds are often employed to help LBW babies based on their birth weight and gestational age.¹

Paladai feeding is a common method feeding employed in Southern and Eastern India, while its use in the rest of country is uncommon. Overall, katori-spoon method is preferred in many regions across India. However, there is paucity of literature comparing paladai feeding and katori – spoon feeding and superiority of one method over the other is not known.

Paladai feeding is not used for feeding babies in the state of Meghalaya and katori – spoon method is the widely used method for feeding neonates. A paladai is a small bowl with a long pointed tip. The assumed advantages of this feeding method are that it is usually faster than spoon or cup feeding and that there is less spillage. The

disadvantage is that the caregiver has to be very careful to avoid pouring large amounts of milk into the infant's mouth.



Figure 1: Katori - Spoon and Paladai Feeding.¹

Spoon and katori (Spoon and bowl) are easily available and easily washable and sterilizable. A disadvantage of this method is that it is a slow method of feeding because the spoon has to be refilled every

time. Additionally the care giver has to hold the milk container (katori) in another hand while holding the infant semi upright which is often difficult.

METHODS

The present study has been undertaken by the Department of Paediatrics and Neonatology, Nazareth Hospital which is a tertiary care hospital in Shillong, the capital of the state of Meghalaya, India. The department provides Level II and III care to neonates. The average intramural births in Nazareth Hospital is around 2500 per annum and there are a fair number of extramural referrals also. This study was carried out for 12 months from 1st January 2016 to 31st December 2016. Informed written consent was obtained from the parents. Ethical approval was duly obtained from the Institutional Ethical Committee of the hospital.

All low birth weight babies more than 30 weeks post conceptional age born at the hospital or referred after birth from other hospitals, who were hemodynamically stable and fit to be fed by oral alternative methods of feeding (katori – spoon or paladai) were included in the study. **Exclusion Criteria** comprised of babies with gross congenital anomalies, neurological problems like birth asphyxia, surgical complications, or if the mother's expressed milk was not available.

The enrolled neonates were divided into four categories: **Group I:** 30wk-31 weeks 6 days PCA, **Group II:** 32wk-33 weeks 6 days PCA (post-conceptional age), **Group III:** 34wk -36 weeks 6 days PCA & **Group IV:** > 37 weeks PCA.

The nurses in the neonatal intensive care unit were trained before the onset of study by the investigators of this study with the help of videos (from www.newbornwhooc.org) and other teaching material regarding both methods of feeding, i.e. katori- spoon and paladai.

The neonates allocated were fed by either of the two methods of oral alternative feeding, i.e. katori – spoon or paladai. The allocation of the neonates in the two arms was done by cluster group randomization pre-generated by online software. The neonates were fed only by expressed breast milk. Initiation, progression, stoppage was according to standard protocols (AIIMS – NICU protocol 2008 for feeding low birth weight babies).

Study Design:

Randomised cross sectional study

Participants:

96 neonates who were more than 30 weeks gestation and hemodynamically stable and fit to be fed by any of the methods of alternative oral feeding were enrolled in the study. Allocations of neonates into the groups were done by cluster group randomisation pre generated by online software.

The enrolled neonates were divided into 4 groups -**Group I:** 30wk-31 weeks 6 days PCA, **Group II:** 32wk-33 weeks 6 days PCA (post-conceptional age), **Group III:** 34wk -36 weeks 6 days PCA & **Group IV:** > 37 weeks PCA.

Parameters Measured In Each Group:

1. Daily weight gain.
2. Amount of spillage per feed.
3. Time to mature breast feeds
4. Development of complications.

Additional outcome measured was mothers' and nurses' satisfaction in administering the two methods of feeds.

Nurses' Survey: The nurses on duty in the neonatal intensive care unit were asked to fill up a proforma to assess their levels of satisfaction with each method. The nurses' proforma had 10 open ended statements which had scope for responses such as strongly disagree, disagree, somewhat agree, agree, completely agree. The following statements in the nurses' proforma required response on a Likert scale –

1. Method of teaching is easier to teach and train to mothers
2. Method of feeding is easier to manage logistically, e.g to collect, store and feed

3. Preparation of articles is easier
4. I am comfortable with this method of feeding
5. This method is more acceptable for baby
6. Milk spills less with this method
7. Baby can be positioned and managed better with this method
8. Baby learns to breastfeed faster with this method
9. Mother will be able to continue this method after baby is shifted out of NICU
10. Family members will support this method

Mothers' Survey: Similar to nurses' survey, another set of questionnaire was given to each of the mothers of the neonates enrolled in this study. There were 10 open ended statements that required any one of the responses such as strongly disagree, disagree, somewhat agree, agree, completely agree. The following statements in the mothers' proforma required their response on a likert scale –

1. I have been explained and taught about this method of feeding my baby
2. I had heard and known about this method of feeding from before
3. Preparation of articles is easy
4. I am comfortable with this method of feeding
5. This method is easier for my baby
6. Milk spills less with this method
7. I can position my baby well during feeding
8. My baby appears satisfied with this method
9. I will be able to continue this method when my baby is discharged from NICU
10. My family members will support me in this method of feeding

The bibs that were used were measured before feeding and then after feeding. The weights of the bib after feeding were subtracted from the weights of the bib taken prior to feeding. To maintain uniformity first 15 readings were taken for each neonate. The daily weight of the neonates were taken. The final weight taken was the weight on the day of 15th reading.

After discharge of the neonate from NICU, the responsibility of feeding was given to mother. During the neonate's stay in the NICU, the mother was trained to feed the neonate with the katori – spoon and/or paladai depending on the group to which the neonate belonged.

Data were analysed by descriptive (frequency distribution tables, distribution, mean, and SD) and inferential (Chi-square, Mann–Whitney, t-test for difference of means, z-score for difference of means) statistical tests in SPSS 22.

RESULTS

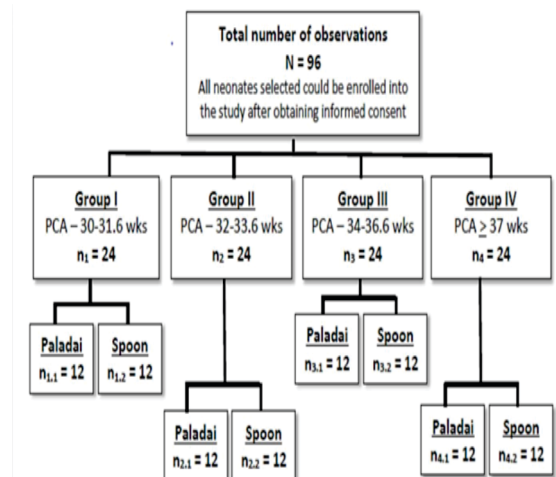


Figure 2: Study Flow Chart

A total of 96 neonates were enrolled in this study, out of which 48 were given Paladai feeding and 48 were given katori - spoon feeding. The enrolled neonates were divided into 4 categories based on their post - conceptional age (PCA), as discussed earlier. Each of

the 4 categories of PCA included 24 neonates, out of which 12 neonates were fed with paladai and 12 neonates were fed with spoon /katori.

Overall, there were 19 male neonates and 29 female neonates who received paladai feeding and 23 male neonates and 25 female neonates who received spoon feeding. The p-values obtained to determine if outcome of method of feeding was dependent on gender in each PCA group were - PCA I - 0.41, PCA II- 0.37, PCA III - 0.68 and PCA IV - 0.68. Hence, outcome of method of feeding was found to be independent of gender in each PCA group.

Out of those enrolled in this study, there were 64 neonates who were delivered at Nazareth hospital (intramural births) (33 received paladai and 31 received spoon feeding) while 32 babies were extramural births (15 paladai fed and 17 spoon fed). The p-values obtained to determine if place of birth had any impact on outcome on type of feeding were as follows- PCA 1-0.99, PCA 2- 0.99, PCA 3-0.37 and PCA 4- 0.54. Hence the outcome of feeding was **independent** of place of delivery.

Mean Weight Gain: One of the main objectives of the study was to compare the two methods in terms of mean weight gain of the babies.

Table 1: Mean Weight Gain In Each PCA In Both The Arms And Mean Weight Gain In Both Methods Of Feeding

PCA	PALADAI		SPOON		pvalue
	Mean(kg)	SD	Mean(kg)	SD	
PCAI	1.40	0.15	1.46	0.11	0.95
PCAIH	1.51	0.18	1.41	0.10	0.91
PCAIH	1.40	0.13	1.45	0.18	0.96
PCAIH	1.51	0.14	1.52	0.24	0.98
	PALADAI		SPOON		p-value
MEAN(kg)	1.460kg(0.161)		1.464kg(0.169)		0.906

Mean weight gain of the babies in each of the PCA's was found to be independent of the method of feeding.

Spillage: Regarding spillage with the method of feeding, it was found that mean spillage of milk was independent of the method of feeding, for each PCA as well as overall (Table 2). This difference was not statistically significant ($p > 0.05$).

Table 2: Mean Spillage In Both Arms

PCA	PALADAI		SPOON		pvalue
	Mean	SD	Mean	SD	
PCAI	0.632	0.07	0.61	0.56	0.900
PCAIH	0.62	0.04	0.63	0.07	0.955
PCAIH	0.61	0.06	0.63	0.06	0.907
PCAIH	0.64	0.08	0.58	0.04	0.742
	PALADAI		SPOON		p-value
Mean(gms)	0.6290(0.667)		0.6175(0.0622)		0.37

Time To Mature Breast Feeds: The mean number of days taken to reach mature breast feeds in each PCA groups with paladai and katori spoon methods of feeding are depicted in Table 3, implying that method of feeding did not alter the time taken to achieve full enteral feeds significantly.

Table 3: Mean Number Of Days Taken To Achieve Mature Breast Feeds In Each PCA Category.

PCA	PALADAI		SPOON		p value
	MEAN	SD	MEAN	SD	
PCAI	4.58	0.953	6.16	1.21	0.907
PCAIH	3	1.290	4.16	1.21	0.852
PCAIH	0.583	0.640	1.5	1.7	0.387
PCAIH	0.41	0.950	0.91	0.75	0.171
	PALADAI		SPOON		p-value
MEAN(Days)	2.143(1.99)		3.182(2.46)		0.694

Complications: Only 3 neonates developed complications related to the method of feeding. Complication was in the form of cough, difficulty in swallowing due to aspiration. 2 neonates developed complication in the paladai arm (both belonged to PCA I group. Only 1 neonate in the katori – spoon arm developed complication.

Nurses' Satisfaction:

Paladai was preferred over katori – spoon by the nurses on the following counts -

- Logistical management (Method of feeding is easier to manage logistically, e.g to collect, store and feed) p -value < 0.001
- Spillage – $p < 0.001$
- Positioning of the baby while feeding was better - $p < 0.001$
- Babies learnt to breast feed faster – $p < 0.001$

Katori – spoon method was preferred by nurses over paladai on the following counts –

- Preparation of articles is easier – $p = 0.012$
- I am comfortable with this method of feeding – $p < 0.001$
- This method is more acceptable for baby - $p < 0.001$
- Mother will be able to continue this method of feeding after discharge from NICU – $p < 0.001$

No difference in either method was found for the statements –

- Family members will support this method
- Method of feeding is easier to teach and train to mothers

Mothers' Satisfaction:

Paladai was preferred by the mothers over katori – spoon on the following counts –

- I am comfortable with this method of feeding – $p = 0.022$
- Milk spillage is less with this method – $p < 0.001$
- Positioning of my baby is better with this method – $p = 0.001$
- My baby appears satisfied with this method – $p = 0.019$

Katori – spoon method was found by mothers to be superior to paladai method on the following counts –

- I have heard about this method of feeding before (previous knowledge) – $p < 0.001$

No statistical significance was found between the two methods in the mothers' responses with respect to the following –

- I have been explained and taught about this method of feeding
- Preparation of articles is easier
- This method is easier for my baby
- I will be able to continue with this method after discharge from NICU
- My family members will support me in this method of feeding

DISCUSSION

The present study concluded that the outcome of feeding was independent of gender and place of birth as far as the type of feeding (Paladai vs katori - spoon) was concerned.

It was also concluded that mean weight gain was independent of method of feeding overall as well as in each PCA group. Differing results were obtained in various studies previously conducted. A study was carried out by **Maryam, et al (2014)²** and **Narayanan et al(2007)³** in which it was concluded that mean weight gain in neonates was significantly higher in Paladai type of feeding as compared to cup type of feeding 7 days after intervention. However, **Aloysius et al (2007)⁴** concluded that Paladai method of feeding led to less weight gain, though this study compared Paladai method of feeding with bottle-feeding.

In the present study, it was concluded that spillage was not dependent on method of feeding ($p = 0.37$) But, in a study carried out by **Nidhi M et al (1999)⁵**, it was concluded that spillage of milk was more in cup type of feeding.

In the present study, mean number of days taken to reach mature breast feeds over all in the two methods of feeding as well as in each PCA group was found to be independent of method of feeding. A similar study carried by **Maryam Marofi et al (2016)⁶** compared time interval to reach full enteral feeding between groups of paladai type of feeding and cup type of feeding. In that study it was concluded that time taken to reach oral feeding was significantly lower in Paladai feeding as compared to cup feeding.

Similarly, here it was concluded that total mean time taken to reach mature breast feeding is independent of method of feeding overall as well as in each category of PCA. But, in a study carried out by **Dalal (2013)⁷**, it was found that Paladai type of feeding significantly improved nutritional function and time taken to achieve breast

feeding in premature babies, so that they could be transferred to their mothers earlier.

As far as nurses' and mothers' attitude towards paladai and katori - spoon feeding was concerned (as elicited by the questionnaire), there are hardly any studies done previously to document the same.

The results of the present study were a bit surprising to the authors with respect to the absence of any differences to the two types of feeding.

CONCLUSION

In the present study, it was found that there is no difference in the outcome of method of feeding i.e Paladai feeding and katori - spoon feeding in terms of mean weight gain, mean spillage, mean time taken to mature breast feeding and complications.

Moreover, nurses preferred paladai to spoon with respect to logistical management of feeding. Nurses found katori - spoon superior to paladai in terms of ease of preparation of articles, comfort and acceptability. Mothers and nurses both felt milk spillage was less, positioning of the baby while feeding was better and babies learnt to breastfeed faster with paladai feeding than katori - spoon feeding.

Nurses felt continuing katori - spoon feeding beyond NICU stay will be easier in comparison to paladai feeding. Mothers were more comfortable with paladai feeding than katori - spoon feeding.

Funding: The authors of this study received no funding from any source whatsoever for carrying out this study.

Contributors: Arti Sharma was the principal investigator and corresponding author. SD, PRG were the co investigators. Pramod Paharia helped in the study design. Ankur Sharma, Prasenjit Paul, SY and JP along with all other authors prepared and reviewed the manuscript.

Conflict of Interest– Nil

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