

ORIGINAL ARTICLE

A Comparative Study to Assess the Breast Milk Volume among the Mothers of Preterm Babies with Manual Expression and Breast Pump Expression in Selected a Hospital at Kolar

Lavanya Subhashini, Sumalatha C V*, Sherin Mariyam

Sri Devaraj Urs College of Nursing, Tamaka, Kolar, Karnataka, India

*Corresponding author:

Sumalatha C V, Assistant Professor, Sri Devaraj Urs College of Nursing, Tamaka, Kolar, Karnataka, India. E-mail: sumapraviingowda@gmail.com

Received date: June 03, 2024; Accepted date: January 08, 2025; Published date: January 31, 2025



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0](https://creativecommons.org/licenses/by-nc/4.0/).

Abstract

Background and aim: Prematurity is a crucial problem associated with large numbers of perinatal mortality and morbidity in developed and developing countries. Taking measures in early feeding the preterm babies with breast milk reduces the mortality and morbidity. Breast milk is the best nutrition for preterm neonates. Early initiation and breast milk expression benefit the preterm babies and their mothers. Hence the present study was conducted to evaluate breast milk volume among the mothers of preterm babies by comparing manual and breast pump methods of expression.

Methods: A non-experimental comparative study was carried out to estimate the human milk quantity expressed through hand and via electric pump techniques. A randomized sampling method was employed to choose the 40 mothers of preterm babies admitted to R.L. Jalappa Hospital Research Centre. Breast milk volume was assessed for 7 days continuously in the morning, afternoon, and evening. Data was recorded in a breast milk volume assessment score sheet and analyzed.

Results: There was no significant difference between manual and breast pump expression methods.

Conclusion: Regardless of this, mothers can choose any method of expression that will help in initiating and early establishment of breastfeeding.

Keywords: Milk volume, Manual method, Breast pump method, Milk expression, Preterm babies

Introduction

The number of premature births is becoming more every day, approximately 15 million preterm babies are born worldwide every year. Prematurity accounts for the highest number of low-birth-weight babies. In India, approximately 30% of neonates i.e, 7.5 million, are born with a low birth weight (less than 2500 gm), accounting for about 42% of the global burden. Over

80% of newborn deaths take place among LBW/ preterm neonates.¹⁻²

A child born before 36 weeks of gestation is typically transferred to the Neonatal Intensive Care Unit (NICU) for continuous essential care.³ Preterm babies in NICU are at higher risk of developing neuro-developmental problems and other complications of respiratory, gastrointestinal, and renal systems.⁴ Human

milk feeding is recommended as the natural and ideal nutrition for preterm infants, serving as an affordable strategy in reducing disease and economic burden.⁵

Premature birth is associated with an immature mammary gland, delayed lactogenesis phase II, inadequate breast suckling, and maternal strain, resulting in less milk production in the early days.⁶⁻⁷ Mother's milk is highly recommended for preterm infants which are attributed to its benefits on growth and development. Various studies suggest that infants fed with breast milk exhibit highest immunological properties. The use and storage of breast milk in the NICU have greatly improved, leading to better contributions and a higher quality supply of breast milk, which in turn enhances the child's immunity. A large body of literature has highlighted the significant advantages of breastfeeding for preterm infants.⁸⁻¹⁰

Early initiation of milk expression within one hour of birth is an important aspect of the availability of breast milk.¹¹ Infants should be given with expressed breast milk, through nasogastric/orogastric tubes or cup feeds.¹² Some mothers of preterm neonates face difficulties in initiating and maintaining sufficient milk production. Unlike term babies, most preterm infants are unable to feed directly at the breast due to immaturity, sickness, and maternal-infant separation. Hence milk should be expressed either by manual or pump method. Manual expression is a quality practice for milk production, and a breast pump is used as an alternative modality during lactation failure.¹³⁻¹⁴

Specialists and lactation consultants believe that breast milk expression is a helpful alternative for mothers to feed their babies when direct breastfeeding is not convenient or feasible.¹⁵ Expressing breast milk is an important skill for lactating women to learn, especially in cases of urgency. It is safe and effective to express milk by hand. There are many advantages during the hand expression such as there is no special equipment is needed; it can be used in emergencies as well as it can be stored and transported.¹⁶ The electric breast pump takes less time than a hand and there are varieties of breast pumps available in the market. Some electrical breast pumps allow the pumping of both breasts at the same time. Mothers have adopted various methods to express milk.¹⁷ Few studies have compared the different methods of milk expression.¹⁷⁻¹⁸ Hence there is a need to evaluate the milk volume by using the breast pump method and hand expression method.

Materials and Methods

A non-experimental comparative study was used to evaluate the breast milk volume by using the breast pump method and hand expression method. Samples collected from 40 mothers of preterm neonates admitted to NICU with gestational age less than 32 weeks who were advised for NG tube feeding and Palada feeding at R. L. Jalappa Hospital and Research Center, Tamaka, Kolar. Ethical clearance was obtained from the institute's ethics committee. The samples were selected by using a simple random sampling technique. Preterm neonates who are critically ill were excluded from the study. The mothers were divided into two groups: 20 in the manual expression group and 20 in the breast pump expression group. The subject's data profile includes the following parameters: gestational age of the mother, birth weight, gender, Apgar score, age of the mother, and the mother's medical conditions. The milk volume assessment score sheet was prepared and validated by subject experts to assess the milk volume. On the day of data collection, investigators introduced themselves to the participants, informed the purpose of the study, and then informed consent was obtained from the mothers of neonates.

During each day of milk expression, investigators observed and assisted mothers in expressing the breast milk by manual and breast pump method. The breast milk volume was assessed daily in the morning, afternoon, and evening for 7 consecutive days, with the quantity of milk recorded in the milk volume assessment score sheet. Figure 1 shows the flow of the study. Socio- demographic data was analyzed by using descriptive statistics and breast milk comparison was analyzed by using the student 't' test using SPSS software.

Results

Table 1 demonstrates that the majority of mothers in the manual expression group had a gestational age of 30 weeks, while those in the breast pump group had a gestational age of 29 weeks. The age range of mothers was 22-26 years in the manual group and 26-30 years in the breast pump group. Most of the babies were male, with birth weights between 1200-1500 gm in both groups. The majority of mothers in the manual group had completed high school education, while those in the breast pump group were graduates. In both groups, most mothers were homemakers.

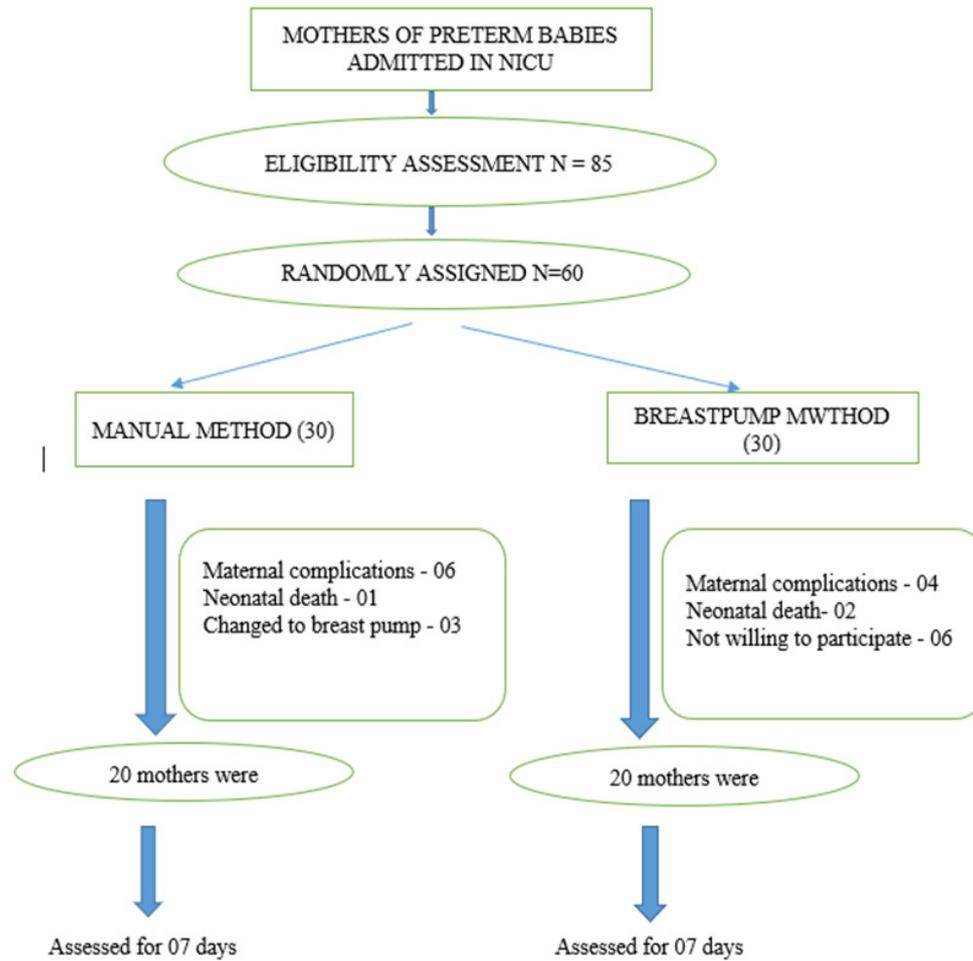


Figure 1: Consort Diagram of subjects included

Sl. No	Variables	Manual		Breast Pump	
		Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
1.	Gestational age of mother				
	32 weeks	4	20	6	30
	31 weeks	4	20	2	10
	30 weeks	7	35	5	25
	29 weeks	5	25	7	35
2.	Age of mother				
	18 - 22 years	3	15	3	15
	22 - 26 years	9	45	9	45
	26 - 30 years	7	35	6	30
	>30 years	1	5	2	10
3.	Gender of the Baby				
	Male	11	55	12	80
	Female	9	45	18	40
4.	Birth weight of the baby				
	1200 -1500 gm	10	50	9	45
	1501 -1800 gm	9	45	8	40
	1801 - 2000 gm	1	05	3	15
5.	Education of the mother				
	High School	7	35	7	35
	PUC	5	25	2	10
	Graduates & Above	6	30	9	45
	Illiterate	2	10	2	10
5.	Occupation of the mother				
	Homemaker	15	75	15	75
	Agricultural field	0	0	0	0
	Private employee	2	10	1	05
	Government employee	3	15	4	20

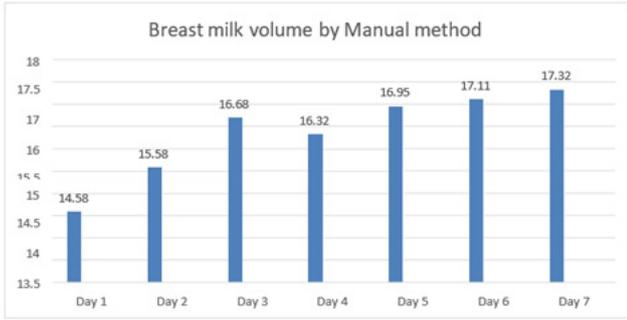


Figure 2: Breast Milk volume by Manual Method

As shown in Figure 2, in the manual method of breast milk expression, the milk output increased gradually. On the first day of expression, the breast milk was 14.58 ml and on the last day, the quantity of milk increased to 17.32 ml.

As shown in Figure 3, in the breast pump expression group, there was also a gradual increase in the quantity of milk day by day. On the first day, the breast milk volume was 14.16 ml and by the last day, the quantity of milk increased to 16.79 ml.

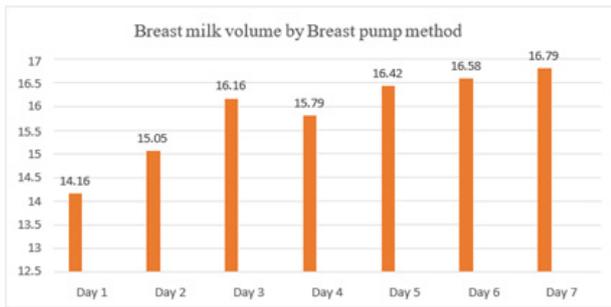


Figure 3: Breast Milk volume by Breast pump Method

As shown in Table 2, it is evident that there is no significant difference between the manual method and breast pump expression. In both methods, a gradual increase in the quantity of milk was observed by day 7. Hence both the methods can be chosen as per the availability and comfort of the mother. In this study, though there was an increase in the quantity of milk in both methods, the mothers were comfortable with the manual method of expressing milk.

Table 2: Comparison of breast milk volume by manual method and breast pump method among the mothers of preterm babies

Method	MEAN ± SD	df	P value
Manual	16.36 ± 0.90	39	0.092
Breast Pump	15.85 ± 0.76		

Discussion

Human milk is recommended for growth and nutrition of the baby. Expressing milk manually or by using a breast pump helps maintain milk production and ensures that the baby receives an adequate supply of milk. This study was conducted to compare the volume of milk by manual and breast pump methods. Only one similar study was identified, conducted in India.¹⁹ However, another study found that manual expression resulted in significantly lower total daily milk volume compared to using an electric pump.²⁰

A study conducted by Dilma A found that the electric pump method is superior compared to the hand expression method for producing adequate breast milk among mothers of preterm babies.²¹ It is evident from our study that there is no significant difference between the manual method and the breast pump method of milk expression. Hence early expression will be very useful among preterm mothers to achieve adequate and exclusive breastfeeding by any method. Studies focussing on multiple hospitals, incorporating both private and public institutions, rather than being limited to a single hospital are recommended. Additionally, it should specifically target working mothers and include a larger sample size to enhance the robustness of the findings.

Conclusion

The overall assessment of the study revealed that both hand expression and electric pump methods are effective. Since there is no significant difference between the manual method and the breast pump technique, mothers can choose either method based on their preference.

Funding

The project was funded by affiliating university RGUHS, Bangalore for UG project code- UG23NUR369

Conflicts of interest

Nil

Acknowledgement

We acknowledge staff nurses and mothers of preterm babies.

References

1. Liu L, Oza S, Hogan D, et al. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities:

- an updated systematic analysis. *Lancet*. 2015; 385(9966):430-40.
2. WHO. World Health Organization. Nacimientos Prematuros. 2015. Available online: <http://www.who.int/mediacentre/factsheets/fs363/es/> (accessed on 15 February 2021).
 3. Lawn JE, Davidge R, Paul VK, *et al.* Born too soon: care for the preterm baby. *Reprod Health* 2013;10: 1-9.
 4. Luu TM, Rehman Mian MO, *et al.* Long-Term Impact of Preterm Birth: Neurodevelopmental and Physical Health Outcomes. *Clin Perinatol* 2017;44(2):305-314.
 5. Cerasani J, Ceroni F, De Cosmi V, *et al.* Human milk feeding and preterm infants' growth and body composition: a literature review. *Nutrients* 2020;12(4):1155.
 6. Farah E, Barger MK, Klima C, *et al.*, Hershberger P. Impaired lactation: review of delayed lactogenesis and insufficient lactation. *Journal of midwifery & women's health*. 2021;66(5):63140.
 7. Lau C. Development of suck and swallow mechanisms in infants. *Ann Nutr Metab* 2015;66(Suppl 5):7-14.
 8. Breastfeeding and the use of human milk. Policy statement. American Academy of Pediatrics. *Pediatrics* 2005;115(2), 496-506.
 9. Hurst NM, Meier P. Breast feeding the preterm baby. *Breastfeeding and Human Lactation* 2005(3),367-400.
 10. Vohr BR, Poindexter BB, Dusick AM, *et al.* Beneficial effects of breast milk in the neonatal intensive care unit on the developmental outcome of extremely low birth weight infants at 18 months of age. *Pediatrics* 2006;118(1):e115-23.
 11. Sharma, IK, Byrne, A. Early initiation of breastfeeding: a systematic literature review of factors and barriers in South Asia. *Int Breastfeed J* 2016;11, 17.
 12. Maggio L, Costa S, Zecca C, Giordano L. Methods of enteral feeding in preterm infants. *Early Hum Dev* 2012;88(Suppl 2):S31-S33.
 13. Steurer LM, Smith JR. Manual expression of breast milk: A strategy to aid in breastfeeding success. *The Journal of perinatal & neonatal nursing* 2018 ;32(2):102-3.
 14. Ru X, Huang X, Feng Q. Successful full lactation achieved by mothers of preterm infants using exclusive pumping. *Front Pediatr* 2020;8:191.
 15. Glynn L, Goosen L. Manual expression of breast milk. *J Hum Lact* 2005;21(2):184-6.
 16. Slusher T, Slusher IL, Biomdo M, *et al.* Electric breast pump use increases maternal milk volume in African nurseries. *J Trop Pediatr* 2007;53(2):125-30.
 17. Becker GE, Smith HA, Cooney F. Methods of milk expression for lactating women. *Cochrane Database Syst Rev*. 2016;9(9):CD006170.
 18. Çınar N, Karakaya Suzan Ö, *et al.* Investigation of the effect of human milk expression techniques on milk content: a systematic review. *J Trop Pediatr* 2021;67(6):fmab108.
 19. Dhanawat A, Behura SS, Panda SK. Manual Method vs Breast Pump for Breast Milk Expression in Mothers of Preterm Babies During First Postnatal Week: A Randomized Controlled Trial. *Indian Pediatr* 2022;59(8):608-12.
 20. Lussier MM, Brownell EA, Proulx TA, *et al.* Daily breastmilk volume in mothers of very low birth weight neonates: A repeated-measures randomized trial of hand expression versus electric breast pump expression. *Breastfeed Med* 2015;10(6):312-7.
 21. Dlima A, Sreekumar K, Silveira MP. Daily breastmilk volume in mothers of very-low-birth-weight neonates: a randomized trial of hand expression versus electric pump form expression. *Breastfeed Rev* 2024;32(1).