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Research Article

A Retrospective Analysis of Baseline Characteristics in Preterm Infants: Comparing Colostrum Oral Care and Control Groups

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Abstract

Objective: To assess the baseline characteristics of preterm infants in the colostrum oral care group and control group, focusing on hospital stay, transition to oral feeding, birth weight, discharge weight, abdominal distension, vomiting, and sucking ability.

Methods: A total of 80 preterm infants were divided into the colostrum oral care group (n = 40) and the control group (n = 40). Continuous variables such as hospital stay, transition to oral feeding, birth weight, and discharge weight were analyzed using descriptive statistics. Categorical variables, including abdominal distension, vomiting, and sucking ability, were analyzed using chi-square tests.

Results: The mean hospital stay was 28.48 ± 20.79 days in the colostrum oral care group and 26.30 ± 17.42 days in the control group ($p = 0.613$). There were no significant differences in birth weight ($p = 0.509$) and discharge weight ($p = 0.739$) between the two groups. However, significant differences were found in abdominal distension ($\chi^2 = 9.06$, $p = 0.003$) and sucking ability ($\chi^2 = 28.4$, $p < 0.001$), with a higher prevalence of abdominal distension in the control group and better sucking ability in the colostrum oral care group.

Conclusion: The colostrum oral care group demonstrated better outcomes in terms of sucking ability, and there was a significant reduction in abdominal distension compared to the control group.

Keywords: Preterm Infants, Colostrum oral care, abdominal distension, sucking ability

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Introduction

Preterm infants are vulnerable to a range of complications due to their early birth, including feeding intolerance, delayed growth, and developmental delays[1]. These challenges are significant contributors to the high morbidity and mortality rates observed in this population[2,3]. Feeding intolerance can lead to difficulties with growth and nutrition[4], while delayed growth may have long-term implications for the infant's physical and cognitive development[5]. Addressing these issues is crucial for improving neonatal care and outcomes for preterm infants.

Colostrum oral care has become an essential component of neonatal care, particularly in preterm infants, where it is believed to influence feeding tolerance and overall growth[6,7]. Research has shown that colostrum oral care practices, such as the use of pacifiers or non-nutritive sucking, may facilitate the transition to oral feeding, enhance sucking ability, and reduce the incidence of feeding intolerance[8,9]. In addition, colostrum oral care may play a role in improving the general well-being and feeding outcomes, potentially decreasing the length of hospital stays and promoting more favorable weight gain patterns[10].

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This study seeks to compare the baseline characteristics of preterm infants who received colostrum oral care with those in a control group. Key outcomes of interest include hospital stay duration, transition to oral feeding, and growth parameters such as birth weight and discharge weight. Additionally, the study evaluates the incidence of abdominal distension, vomiting, and sucking ability, which are critical factors influencing feeding tolerance and overall health in preterm infants. The findings of this study will provide valuable insights into the potential benefits of colostrum oral care in neonatal care settings and contribute to the development of evidence-based practices for improving preterm infant outcomes[11,12].

1 Methods

1.1 Study Design and Population

This retrospective study was conducted at the Baise Maternal and Child Hospital in the neonatal care unit. A total of 80 preterm infants were included in the study, with 40 infants in the colostrum oral care group and 40 infants in the control group. The inclusion criteria required infants to be born at <37 weeks gestational age. Infants in the colostrum oral care group received standardized colostrum oral care, while those in the control group received routine neonatal care without any standardized colostrum oral care intervention. The study aimed to compare baseline characteristics between the two groups, focusing on variables such as hospital stay, transition to oral feeding, growth parameters (birth weight and discharge weight), and the incidence of abdominal distension, vomiting, and sucking ability.

1.2 Data Collection Instruments

Research data were collected using a structured "Baseline Characteristics Form", which was specifically designed for this study. The form included detailed information on the following variables:

Demographic Information: Infant's gender, gestational age, and birth weight.

Clinical Parameters: Hospital stay duration, transition time to oral feeding, discharge weight, and abdominal distension.

Feeding Tolerance: Incidence of vomiting, abdominal distension, and assessment of sucking ability (categorized as "Good" or "Fair").

The data were collected prospectively during the infants' hospital stay and were recorded by trained medical staff at the neonatal care unit.

1.3 Colostrum oral care Intervention

Infants in the colostrum oral care group received a standardized colostrum oral care protocol based on existing literature and clinical practice guidelines. The experimental group additionally received colostrum oral care on this basis. Colostrum is rich in trace elements, immunologically active molecules, and digestive enzymes, which can promote gastrointestinal development and the initiation and maturation of immune function in newborns. Starting within 24 hours after birth, the procedure was performed every 4 hours. After cleaning the infant's oral cavity, a minimal amount of colostrum (approximately 0.2 ml) was drawn using a 1 ml sterile syringe and slowly instilled into the inner sides of the infant's cheeks, 0.1 ml on each side. The control group received routine care combined with abdominal massage. Routine care included umbilical cord care, sponge baths, strict monitoring of vital signs, and posture management. Abdominal massage was performed by trained neonatal specialist nurses when the infant's vital

signs were stable, 1 hour after feeding. Using the finger kneading technique, the nurses massaged the infant's abdomen to stimulate intestinal peristalsis, enhance gastric motility, and promote gastric emptying.

1.4 Data Collection from Both Groups

For both groups, continuous monitoring of clinical variables was performed daily. These included:

1. Hospital Stay: Duration from birth to discharge.
2. Transition to Oral Feeding: The time taken for the infant to successfully transition from tube feeding to oral feeding.
3. Growth Parameters: Birth weight and discharge weight were recorded, and daily weight gain was calculated.
4. Feeding Tolerance: The incidence of abdominal distension (measured by clinical observation and palpation), vomiting (measured by the number of vomiting episodes per day), and sucking ability (measured by clinical assessment of the infant's ability to feed orally).

Data were collected and documented on the "Baseline Characteristics Form" during the infants' hospital stay. Both groups were monitored closely for any adverse events or complications, and all measurements were taken at the same time points to ensure consistency.

2 Data Analysis

The data were analyzed using the R (version4.4.1). Descriptive statistics, including the calculation of means ± standard deviation (SD) for continuous variables and percentages for categorical variables, were used to summarize the baseline characteristics of the two groups. The independent t-test was employed to compare continuous variables (e.g., hospital stay, transition to oral feeding, birth weight, discharge weight) between the colostrum oral care and control groups. Chi-square tests (χ^2) were used to assess differences in the categorical variables (e.g., abdominal distension, vomiting, sucking ability).

3 Ethical Considerations

The study was approved by the Ethics Committee of Baise Maternal and Child Hospital, Parents of infants in both the colostrum oral care and control groups were fully informed about the study and its procedures before agreeing to participate. All data collected were kept confidential and used solely for research purposes.

4 Results

A total of 80 preterm infants were included in the study, with 40 infants assigned to the colostrum oral care group and 40 infants in the control group. The baseline characteristics of the two groups are summarized in Table 1.

Variable	Colostrum oral care group (n = 40)	Control group (n = 40)	Statistical significance
Hospital stays (days)	28.48 ± 20.79	26.30 ± 17.42	t = 0.51, p = 0.613
Transition to oral feeding (days)	13.22 ± 15.13	12.97 ± 13.40	t = 0.08, p = 0.938
Birth weight (kg)	1.63 ± 0.45	1.69 ± 0.41	t = 0.66, p = 0.509
Discharge weight (kg)	2.13 ± 0.30	2.15 ± 0.28	t = 0.34, p = 0.739
Abdominal distension, n (%)			
Yes	10 (25.0%)	24 (60.0%)	χ^2 = 9.06, p = 0.003*
No	30 (75.0%)	16 (40.0%)	
Vomiting, n (%)			
Yes	14 (35.0%)	21 (52.5%)	χ^2 = 1.83, p = 0.176
No	26 (65.0%)	19 (47.5%)	
Sucking ability, n (%)			
Good	31 (77.5%)	8 (20.0%)	χ^2 = 28.4, p < 0.001*
Fair	9 (22.5%)	32 (80.0%)	

There were no significant differences between the two groups in terms of hospital stay (mean ± SD: colostrum oral care group 28.48 ± 20.79 days; control group 26.30 ± 17.42 days, p = 0.613) and the transition to oral feeding (mean ± SD: colostrum oral care group 13.22 ± 15.13 days; control group 12.97 ± 13.40 days, p = 0.938). These results suggest similar recovery times and feeding transition periods between the groups.

The birth weight (mean ± SD: colostrum oral care group 1.63 ± 0.45 kg; control group 1.69 ± 0.41 kg, p = 0.509) and discharge weight (mean ± SD: colostrum oral care group 2.13 ± 0.30 kg; control group 2.15 ± 0.28 kg, p = 0.739) were also similar between the colostrum oral care and control groups, indicating no significant differences in growth during the hospital stay.

The incidence of abdominal distension significantly differed between the groups. In the colostrum oral care group, 25% of infants experienced abdominal distension, compared to 60% in the control group (p = 0.003). This suggests that colostrum oral care may be associated with a reduced occurrence of abdominal distension in preterm infants.

The occurrence of vomiting was not significantly different between the groups, with 35% of infants in the colostrum oral care group and 52.5% in the control group reporting vomiting episodes (p = 0.176). Thus, no clear association was found between colostrum oral care and a reduction in vomiting.

A significant difference was observed in sucking ability. In the colostrum oral care group, 77.5% of infants had good sucking ability, while only 20% of infants in the control group demonstrated good sucking ability (p < 0.001). This indicates that colostrum oral care may improve sucking ability in preterm infants.

5 Discussion

This study aimed to compare the baseline characteristics of preterm infants who received colostrum oral care with those who did not, focusing on key outcomes such as hospital stay, transition to oral feeding, growth parameters, and the incidence of abdominal distension, vomiting, and sucking ability. The findings provide valuable insights into the potential benefits of colostrum oral care for preterm infants in neonatal care settings.

Our results revealed no significant differences between the two groups in terms of hospital stay and transition to oral feeding. Both groups showed similar recovery times (colostrum oral care group: 28.48 ± 20.79 days; control group: 26.30 ± 17.42 days) and similar times to transition to oral feeding (colostrum oral care group: 13.22 ± 15.13 days; control group: 12.97 ± 13.40 days). These findings suggest that colostrum oral care, as implemented in this study, did not have a substantial effect on the overall length of hospitalization or the time taken for preterm infants to transition from tube feeding to oral feeding[13]. This is consistent with some previous studies that have found no major impact of colostrum oral care on hospital stay duration. However, it is important to note that other studies have suggested that colostrum oral care can facilitate feeding and potentially reduce the time to achieve full oral feeding[14], particularly with more intensive interventions or targeted protocols[15].

The comparison of growth parameters, including birth weight and discharge weight, also showed no significant differences between the two groups. The birth weight (colostrum oral care group: 1.63 ± 0.45 kg; control group: 1.69 ± 0.41 kg) and discharge weight (colostrum oral care group: 2.13 ± 0.30 kg; control group: 2.15 ± 0.28 kg) were

similar between the groups, indicating that colostrum oral care did not significantly impact weight gain during the hospitalization period. While this finding is in line with previous research suggesting that colostrum oral care may not directly affect weight gain in preterm infants, it is important to recognize that other factors such as nutritional intake and medical management could contribute to growth patterns[10]. Further research could investigate whether more intensive colostrum oral care protocols, such as the combination of non-nutritive sucking with specific feeding plans, might have a more pronounced effect on growth outcomes[16,17].

One of the most notable findings in this study was the significantly lower incidence of abdominal distension in the colostrum oral care group (25%) compared to the control group (60%) ($p = 0.003$). Abdominal distension is a common complication in preterm infants, often linked to feeding intolerance and delayed gastric emptying. The reduction in abdominal distension in the colostrum oral care group suggests that colostrum oral care may help alleviate some of the discomforts associated with feeding, potentially improving feeding tolerance[18]. This finding is consistent with previous studies that have shown the benefits of colostrum oral care in reducing gastrointestinal discomfort and enhancing feeding tolerance in preterm infants[19]. Colostrum oral care, particularly non-nutritive sucking, has been suggested to promote gastrointestinal motility, possibly reducing the incidence of feeding-related complications such as abdominal distension and delayed gastric emptying[20].

The incidence of vomiting, however, did not differ significantly between the two groups (colostrum oral care group: 35%; control group: 52.5%, $p = 0.176$). While there was a trend toward fewer vomiting episodes in the colostrum oral care group, the difference was not statistically significant. This result suggests that colostrum oral care, as implemented in this study, may not be sufficient to reduce vomiting episodes in preterm infants. Previous studies have yielded mixed results regarding the impact of colostrum oral care on vomiting. Some studies have reported a reduction in vomiting with colostrum oral care interventions, while others have found no effect[21]. It is possible that vomiting in preterm infants is multifactorial, influenced by a range of factors including gastric motility, feeding volume, and the infant's overall health status. Further research could explore how different types of colostrum oral care protocols, combined with other interventions, may affect the incidence of vomiting[22].

A striking finding from this study was the significant improvement in sucking ability in the colostrum oral care group. A total of 77.5% of infants in the colostrum oral care group demonstrated good sucking ability, compared to only 20% in the control group ($p < 0.001$). This suggests that colostrum oral care, specifically non-nutritive sucking, may enhance oral motor skills and facilitate the transition to oral feeding. Previous studies have consistently shown that non-nutritive sucking and oral stimulation can improve sucking strength and coordination, helping preterm infants transition from tube feeding to full oral feeding[23]. The improvement in sucking ability in the colostrum oral care group is a promising finding, highlighting the potential role of colostrum oral care in supporting the developmental milestones of preterm infants and reducing the need for prolonged tube feeding[24].

6 Limitations and Future Directions

While the findings of this study provide valuable insights, there are several limitations to consider. Firstly, this was a

retrospective study, and although the groups were matched based on inclusion criteria, the lack of randomization introduces potential biases. Secondly, the colostrum oral care intervention used in this study was relatively simple, involving non-nutritive sucking with pacifiers. It would be valuable for future studies to explore the impact of more intensive colostrum oral care protocols, which could combine non-nutritive sucking with other therapeutic interventions such as oral hygiene practices and feeding support strategies. Additionally, long-term follow-up of these infants would be essential to assess the long-term effects of colostrum oral care on developmental outcomes, feeding abilities, and overall health.

7 Conclusion

In conclusion, this study highlights the potential benefits of colostrum oral care in improving feeding tolerance and enhancing sucking ability in preterm infants. While colostrum oral care did not significantly affect hospital stay, weight gain, or the incidence of vomiting, it was associated with a reduced occurrence of abdominal distension and a marked improvement in sucking ability. These findings support the implementation of colostrum oral care protocols in neonatal units to optimize the care of preterm infants, though further research is needed to establish the most effective and comprehensive colostrum oral care practices.

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Authors' contribution

Meiqian Luo designed and wrote the article. Xueqin Su carried out the feasibility analysis of the article; Xian Zhong managed and collated the literature; Shenghai Huang and Wengui Wei revised the paper; Shenghai Huang was for the control and proofreading of the quality, and the article responsible for the article, Wengui Wei reading and collated reading.

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Ethics approval and consent to participate

This study was approved by the Baise Maternal and Child Hospital and obtained informed consent from the Parents of infants. all methods were performed in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests

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