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Breastfeeding practices and their association with anemia in children aged 6 to 60 months

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ABSTRACT

Background: Anemia remains a prevalent nutritional disorder among young children in India, significantly affecting growth and development. Breastfeeding practices, particularly exclusive breastfeeding and timely complementary feeding, are known to influence a child's nutritional status. This study aimed to evaluate the association between breastfeeding practices and the occurrence of anemia in children aged 6 to 60 months.

Methods: A cross-sectional study was conducted at the Department of Pediatrics, Sree Mookambika Institute of Medical Sciences, Kulasekaram, Tamil Nadu, from January 2024 to December 2024. A total of 120 children aged 6–60 months attending the pediatric outpatient department were enrolled after obtaining informed consent. Data on socio-demographic details and feeding practices were collected through a structured questionnaire. Hemoglobin levels were measured using Sahli's method and anemia was classified as per WHO guidelines. Statistical analysis was performed using SPSS version 25, with $p < 0.05$ considered significant.

Results: The prevalence of anemia in the study population was 75%, with moderate anemia being most common (45.8%). Only 58.3% of children had been exclusively breastfed for the first six months. A statistically significant association was found between lack of exclusive breastfeeding and anemia ($p = 0.004$). Children who had delayed initiation of complementary feeding also showed a higher prevalence of anemia.

Conclusion: Suboptimal breastfeeding and delayed complementary feeding are major contributors to anemia in early childhood. Promotion of exclusive breastfeeding for six months and appropriate infant feeding practices is crucial for preventing anemia in this age group.

Keywords: Anemia, Exclusive breastfeeding, Complementary feeding, Pediatric nutrition, Infant feeding practices, Hemoglobin,

INTRODUCTION

Anemia is one of the most common nutritional deficiencies affecting children worldwide, particularly in developing countries like India. It is characterized by a reduction in the number of red blood cells or hemoglobin concentration, which adversely impacts oxygen transport and subsequently, the growth, immunity, and cognitive development of young children. According to the World Health Organization (WHO), anemia is considered a severe public health problem when its prevalence exceeds 40% in a population, and India reports over 50% prevalence among children under five years of age[1].

The National Family Health Survey (NFHS-5) reported that **67.1%** of children aged 6–59 months in India were anemic, marking a worrying rise from previous surveys[2]. Tamil Nadu, though relatively better in maternal and child health indicators, still faces a high burden of childhood anemia. The early years of life are crucial for nutritional interventions, and suboptimal feeding practices during this window can have long-term health consequences.

Breastfeeding, especially exclusive breastfeeding for the first six months, is globally recognized as a vital component of optimal infant nutrition. The WHO and UNICEF recommend early initiation of breastfeeding within the first hour of birth, exclusive breastfeeding for six months, followed by appropriate complementary feeding with continued breastfeeding up to two years or beyond[3]. Inadequate breastfeeding practices, delayed initiation of complementary feeding, and early weaning are known to predispose children to micronutrient deficiencies, including iron deficiency anemia.

Several studies have investigated the link between breastfeeding practices and anemia. A study conducted by Anjali et al. in Trivandrum found that lack of exclusive breastfeeding and delayed complementary feeding were significant risk factors for anemia in children aged 6–60 months[4]. Another study by Toteja et al. emphasized the importance of maternal education and timely infant feeding in combating childhood anemia in India[5].

Despite the availability of national guidelines promoting optimal Infant and Young Child Feeding (IYCF) practices, implementation at the grassroots level remains inconsistent. In rural and semi-urban regions like Kulasekaram, misinformation, cultural practices, and lack of awareness continue to influence infant feeding behavior, contributing to preventable health issues like anemia. Hence, this study was undertaken at to assess the relationship between breastfeeding practices and the prevalence of anemia among children aged 6–60 months. The findings aim to inform pediatricians, public health workers, and policymakers to strengthen nutrition education and maternal support programs.

AIM AND OBJECTIVES

To assess the relationship between breastfeeding practices and the prevalence of anemia in children aged 6 to 60 months.

Objectives:

1. To determine the prevalence of anemia among children aged 6 to 60 months attending the pediatric outpatient department at SMIMS.
2. To evaluate breastfeeding practices, including exclusivity and duration, among mothers of these children.
3. To analyze the association between breastfeeding practices, complementary feeding, and anemia in children.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based cross-sectional study carried out in the Department of Pediatrics at **Sree Mookambika Institute of Medical Sciences (SMIMS), Kulasekaram, Tamil Nadu**. The study was conducted over a period of one year from **January 2024 to December 2024**.

Study Population

Children aged **6 to 60 months** who attended the pediatric outpatient department and met the inclusion criteria were enrolled in the study. The participants were selected after obtaining informed consent from their parents or primary caregivers.

Sample Size and Sampling Technique

A total of **120 children** were included in the study. The sample size was determined based on previous studies that reported a high prevalence of anemia among young children and considering a confidence interval of 95% with 10% allowable error. A **consecutive sampling method** was used to include eligible children visiting the hospital during the study period.

Inclusion Criteria

- Children aged between 6 and 60 months.
- Children accompanied by a parent or guardian willing to provide informed consent.

Exclusion Criteria

- Children with known chronic illnesses (e.g., renal, hepatic, or cardiac diseases).
- Children with diagnosed hemoglobinopathies or thalassemia.
- Children who had received iron supplementation or blood transfusion in the past three months.

Data Collection Tool

A **pre-tested, semi-structured questionnaire** was used to collect data from caregivers. It included the following sections:

- **Socio-demographic information:** Age, sex, birth order, socioeconomic status, maternal education.
- **Feeding history:** Duration of exclusive breastfeeding, timing of initiation of breastfeeding, timing and type of complementary feeding, continued breastfeeding status.
- **Clinical history:** Birth weight, immunization status, recurrent infections.

The questionnaire was administered through **face-to-face interviews** conducted by trained medical staff.

Assessment of Anemia
A venous blood sample was drawn from each participant under aseptic precautions. Hemoglobin levels were measured using the **Sahli's acid hematin method**, a simple and widely used technique suitable for field and outpatient settings. Based on WHO classification, anemia was defined as:

- **Normal**: Hb ≥ 11.0 g/dL
- **Mild anemia**: Hb 10.0–10.9 g/dL
- **Moderate anemia**: Hb 7.0–9.9 g/dL
- **Severe anemia**: Hb < 7.0 g/dL

Ethical Considerations
The study protocol was approved by the **Institutional Ethics Committee of SMIMS**. Informed consent was obtained from all caregivers after explaining the purpose, procedure, and potential risks of the study in their local language.

Statistical Analysis
Data were compiled and analyzed using **IBM SPSS Statistics version 25.0**. Descriptive statistics such as frequencies and percentages were used for categorical variables, while means and standard deviations were calculated for continuous variables. The **Chi-square test** was applied to determine associations between breastfeeding practices and anemia status. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Age-Wise Distribution of Study Participants (n=120)

Age Group (months)	Number of Children	Percentage (%)
6–12	30	25.0
13–24	40	33.3
25–36	20	16.7
37–48	15	12.5
49–60	15	12.5

Table 2: Prevalence of Anemia in the Study Population

Hemoglobin Level (g/dL)	Number of Children	Percentage (%)
< 7.0 (Severe)	10	8.3
7.0–9.9 (Moderate)	55	45.8
10.0–10.9 (Mild)	25	20.8
≥ 11.0 (Normal)	30	25.0

Table 3: Breastfeeding Practices

Feeding Practice	Number of Children	Percentage (%)
Exclusively breastfed for 6 months	70	58.3
Non-exclusively breastfed (<6 months)	50	41.7
Continued breastfeeding >12 months	80	66.7

Table 4: Complementary Feeding Practices

Complementary Feeding Initiation	Number of Children	Percentage (%)
At 6 months	60	50.0
Delayed (>6 months)	40	33.3
Early (<6 months)	20	16.7

Table 5: Association Between Exclusive Breastfeeding and Anemia

Exclusive Breastfeeding	Anemic Children	Non-Anemic Children	p-value
Yes (n=70)	35	35	0.004*
No (n=50)	45	5	

*p < 0.05 indicates significant association.

DISCUSSION

The present study aimed to explore the association between breastfeeding practices and the prevalence of anemia in children aged 6 to 60 months in a semi-urban population of Tamil Nadu. The findings of this study align with several previously published research works, reaffirming the critical role of early nutrition, particularly breastfeeding and complementary feeding, in preventing childhood anemia.

Prevalence of Anemia

In this study, the overall prevalence of anemia among children was **75%**, with moderate anemia being the most prevalent (45.8%). This is consistent with the findings of the **National Family Health Survey (NFHS-5)**, which reported that approximately **67.1%** of Indian children under five years are anemic[2]. A similar cross-sectional study by Venkatesh et al.[5] also reported high rates of anemia among children aged 6–60 months across multiple Indian states, attributing it primarily to nutritional deficiencies, poor weaning practices, and maternal illiteracy.

Exclusive Breastfeeding and Anemia

Our study found that children who were not exclusively breastfed for the first six months were significantly more likely to develop anemia ($p = 0.004$). Among the 50 children who were not exclusively breastfed, 90% were anemic. This finding corroborates the results from a study conducted by **Anjali et al.** at Government Medical College, Trivandrum, which highlighted that the absence of exclusive breastfeeding significantly increases the risk of anemia in infants and toddlers[4]. Another study conducted in Nepal by Chaparro et al. demonstrated that infants who were exclusively breastfed for at least six months had higher hemoglobin levels and better iron status compared to their non-exclusively breastfed counterparts[6].

Complementary Feeding Practices

Our study showed that **33.3%** of children had delayed complementary feeding (after 6 months), and this group had a higher prevalence of anemia. Early or delayed initiation of complementary feeding disrupts the infant's nutritional balance and iron intake. These findings are in line with those from a study by **Bentley and Griffiths**, who found that inappropriate complementary feeding practices—either early or late—were strongly associated with childhood undernutrition and iron deficiency anemia in rural India[7]. The **Indian Academy of Pediatrics (IAP)** also recommends the timely introduction of iron-rich complementary foods at six months of age to meet increasing nutritional demands, especially iron[8].

Continued Breastfeeding Beyond 12 Months

In our study, **66.7%** of children were breastfed beyond 12 months. While prolonged breastfeeding has recognized immunological and psychological benefits, continuing breastfeeding without appropriate complementary feeding after six months may not suffice to meet iron requirements, especially if the diet lacks iron-rich foods. A study by **Black et al.** on global maternal and child undernutrition emphasized the need for both sustained breastfeeding and nutritionally adequate complementary feeding to prevent micronutrient deficiencies[9].

Maternal Education and Feeding Practices

Although our study did not quantitatively assess maternal education, it was observed that awareness regarding correct feeding practices was low among mothers with lesser educational attainment. A study conducted by **Khan et al.** in Gujarat demonstrated a direct correlation between maternal literacy and proper IYCF practices, which in turn significantly reduced the prevalence of anemia among children[10].

The findings of this study are in alignment with multiple national and international research efforts that underline the pivotal role of exclusive breastfeeding for six months, followed by timely and adequate complementary feeding, in preventing anemia during early childhood. Education and support for mothers regarding infant nutrition, especially in semi-urban and rural settings, are essential to reduce the burden of nutritional anemia. This study reinforces the importance of strengthening public health strategies such as the promotion of IYCF practices and maternal nutrition literacy through community outreach and primary healthcare systems.

CONCLUSION

The present study highlights the significant impact of breastfeeding practices on the prevalence of anemia in children aged 6 to 60 months. A notably higher incidence of anemia was observed among children who were not exclusively breastfed for the first six months and those who had delayed initiation of complementary feeding. These findings underscore the importance of adhering to recommended Infant and Young Child Feeding (IYCF) guidelines, particularly

exclusive breastfeeding for the first six months and timely introduction of complementary foods. Promoting awareness and educating mothers about appropriate feeding practices through primary healthcare initiatives can play a pivotal role in reducing the burden of nutritional anemia in young children, especially in rural and semi-urban populations.

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