

Original Research Article

Factors contributing to inappropriate timing, quantity and consistency in complementary feeding

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ABSTRACT

Background: An appropriate diet is critical in growth and development of children especially in the first two year of life. World Health Organization (WHO) recommends exclusive breast-feeding (BF) for the first 6-month, addition of complementary feeds at 6 months with continued BF till at least 2 years. These feeding recommendations if followed appropriately can decrease infant mortality by 19% and prevent malnutrition especially in developing countries as ours.

Methods: A hospital-based cross-sectional study was conducted at Navodaya Medical College, Raichur, over 6 months. A total of 200 children aged 6 months to 2 years attending Paediatrics OPD of our hospital for minor illness and children who came for immunization, were interviewed after a informed consent.

Results: Among 200 children studied, 32 (16%) were not started on CF at all, and only 35 (17.5%) received CF from 6 months. Of 168 who were started on CF, the mean age was 13.37 months, with adequate quantity in 25% and thick consistency in 38%. Only 3.5% of mothers met all criteria for CF. Knowledge of CF was linked to maternal education ($P < 0.05$). Most common reason for inappropriate practice in 154 mothers who delayed feeds was “tried but did not eat, vomits everything” (52%).

Conclusions: The study reveals a “practice gap” and “knowledge gap” in complementary feeding among mothers, emphasizing the need for education. Addressing these gaps through targeted interventions, during immunization sessions, and enhancing maternal education can significantly improve complementary feeding practices and outcomes in children.

Keywords: Complementary feeding, Breastfeeding, Malnutrition, Nutritional deficiencies, Maternal education, Feeding practices

INTRODUCTION

The first two years of life are a critical period for growth and development, and appropriate nutrition during this time lays the foundation for a child's long-term health and well-being.^{1,2} The World Health Organization (WHO) emphasizes the importance of exclusive breastfeeding for the first six months of life, followed by the introduction of complementary foods at six months while continuing breastfeeding until at least two years of age.²⁻⁵ These feeding recommendations, if followed correctly, can reduce infant mortality by 19% and prevent

malnutrition, particularly in developing countries where access to adequate nutrition and healthcare is often limited.⁶ Complementary feeding (CF) plays a vital role in bridging the nutritional gaps that emerge after six months, such as energy, vitamin A, and iron deficiencies, which cannot be met by breast milk alone.⁸ However, the timing, quantity, and consistency of complementary feeding are crucial factors that determine its effectiveness.¹² Introducing complementary foods too early, before six months, can expose infants to increased risks of diarrheal diseases and malnutrition, especially in settings with poor food and water hygiene.¹³ On the other

hand, delaying the introduction of complementary foods beyond six months can lead to nutritional deficiencies, including iron, zinc, calcium, and sometimes vitamin A and riboflavin, which are essential for growth, cognitive development, and immune function.¹⁵ Despite these well-established guidelines, many mothers face challenges in adhering to recommended feeding practices, leading to suboptimal nutrition for their children.¹⁶

In many low- and middle-income countries, inappropriate complementary feeding practices are prevalent due to a lack of knowledge, cultural beliefs, and socioeconomic constraints.¹⁶ Mothers often struggle with determining the right time to introduce complementary foods, preparing foods of appropriate consistency, and providing adequate quantities to meet their child's nutritional needs. Misconceptions, such as the belief that breast milk alone is sufficient beyond six months or that children cannot digest solid foods, further exacerbate the problem. Additionally, the influence of family elders and traditional practices often conflicts with evidence-based recommendations, creating barriers to optimal feeding practices.¹⁷

This study aims to explore the factors contributing to inappropriate timing, quantity, and consistency in complementary feeding among mothers of children aged six months to two years. By identifying the gaps in knowledge and practice, the study seeks to highlight the need for targeted interventions to improve complementary feeding practices and, consequently, child health outcomes. The findings of this study are particularly relevant in the context of developing countries, where malnutrition and infant mortality rates remain high despite global efforts to promote optimal feeding practices.

By addressing the gaps in complementary feeding practices, this study aims to contribute to the global effort to reduce child malnutrition and improve health outcomes. The findings will provide valuable insights for policymakers, healthcare providers, and community leaders to design and implement targeted interventions that promote optimal feeding practices and ensure that children receive the nutrition they need for healthy growth and development.

METHODS

Hospital-based cross-sectional study was conducted on, total of 200 Mothers of children between 6 months to 2 years attending paediatric OPD at Navodaya Medical College, Raichur, over 6 months from March 2024 to September 2024.

Inclusion criteria

Mothers of children between 6 months to 2 years attending paediatric OPD of our hospital for minor illnesses and children who came for immunization.

Exclusion criteria

Mothers of children <6 months and >2 years of age and those children with severe illnesses admitted to ICUs.

The study procedure involved collecting data through a pre-designed, semi-structured questionnaire administered to the mothers of the children. Information on demographic profiles and complementary feeding practices was gathered to understand the background and feeding habits. The weight of each child was measured and recorded, and protein-energy malnutrition (PEM) was classified according to the Indian Academy of Pediatrics (IAP) guidelines. To assess the quantity of food given to the children, a standard 150 ml katori was shown to the mothers as a reference. The consistency of the food was evaluated using a WHO teaching slide as a visual guide. The adequacy of the feeds was determined based on WHO recommendations to ensure compliance with nutritional standards.

Mothers' knowledge about complementary feeding and the reasons behind inappropriate feeding practices were explored through open-ended questions, allowing for detailed insights into their understanding and challenges. During the study session, all participating mothers were provided with advice and guidance on improving complementary feeding practices to enhance their children's nutrition. Children identified as malnourished or suffering from any illness were referred for appropriate medical care and management in the hospital. This comprehensive approach ensured a thorough evaluation of feeding practices, maternal knowledge, and the nutritional status of the children, while also offering necessary interventions for improvement. And The study was approved by the Institutional Ethics Committee.

Statistical analysis

All statistical analysis was performed according to intention to treat principle by statistical package for the social sciences (SPSS) software version 27 for Windows (SPSS Inc., Chicago, IL, USA). Data was entered into Microsoft excel data sheet and was analysed using SPSS 27 version software. Categorical data was represented in the form of frequencies and percentage. Chi-square test/pooled Chi square was used as test of significance for qualitative data.

RESULTS

The study analysed the timing of complementary feeding (CF) initiation among 200 children aged 6 months to 2 years. Only 17.5% of mothers introduced CF at the recommended age of 6 months, while 5.5% started CF before 6 months, which is considered too early. A significant proportion (34.5%) introduced CF between 7 months and 1 year, and 26.5% delayed CF until 1–2 years. Alarmingly, 16% of children had not received any CF even by 2 years of age (Table 1). These findings

highlight widespread deviations from the World Health Organization (WHO) guidelines.

Table 1: Time of starting complementary feeding.

Time of starting complementary feeding (n=200)	Frequency	%
Before 6 months	11	5.5
At 6 months	35	17.5
7 months to one year	69	34.5
1 – 2 years	53	26.5
CF not started even at 2 years	32	16

Table 2: Reasons for delayed CF.

Reasons for delayed complementary feeding (n=154)	Frequency	%
Tried but failed, as child vomits everything	80	52
Don't exactly know, when to start	47	30.5
Mother feels that her milk is enough for baby	9	5.8
Family elders tell not to give before one year	8	5.2
Mother feels child may not be able to digest it	7	4.6
Mother didn't try as child had no teeth	3	1.9

The study identified key reasons for delayed complementary feeding (CF) among 154 mothers. The most common reason, cited by 52% of mothers, was that the child refused to eat or vomited when CF was introduced. A significant proportion (30.5%) lacked knowledge about the appropriate time to start CF. Other reasons included the belief that breast milk alone was sufficient (5.8%), advice from family elders to delay CF until after one year (5.2%), concerns about the child's ability to digest solid foods (4.6%), and the misconception that teeth are necessary for eating solid foods (1.9%) (Table 2). These findings highlight a combination of practical challenges, lack of awareness, and cultural or traditional beliefs contributing to inappropriate CF practices.

DISCUSSION

The World Health Organization (WHO) recommends exclusive breastfeeding for the first 6 months of life, followed by the introduction of complementary foods at 6 months while continuing breastfeeding until at least 2 years of age.¹⁻³ This recommendation is based on evidence that exclusive breastfeeding provides optimal nutrition and immune protection during the first 6 months, while complementary foods are necessary to meet the increasing nutritional demands of growing infants.⁵ The study highlights significant gaps in complementary feeding (CF) practices and knowledge

among mothers, particularly in the timing, quantity, and consistency of complementary foods introduced to children aged 6 months to 2 years. The findings reveal that only 17.5% of mothers-initiated CF at the recommended age of 6 months, while 16% had not started CF even by 2 years of age. Among those who initiated CF, only 25% provided adequate quantities, and 38% offered foods with appropriate consistency. These findings underscore the critical need for targeted interventions to address the "practice gap" and "knowledge gap" in CF, which are essential for improving child nutrition and reducing the risk of malnutrition and associated morbidity.

However, the study found that only 17.5% of mothers adhered to this guideline, with 34.5% introducing CF between 7 months and 1 year, and 26.5% delaying CF until 1–2 years. Alarming, 16% of children had not received any CF by 2 years of age. The delayed introduction of CF is concerning because it can lead to nutritional deficiencies, particularly of iron, zinc, calcium, and vitamins A and riboflavin.⁶ These deficiencies can impair growth, cognitive development, and immune function, increasing the risk of morbidity and mortality.^{7,8} On the other hand, early introduction of CF (before 6 months) was observed in 5.5% of cases, which is also problematic as it can increase the risk of diarrheal diseases and malnutrition, especially in settings with poor food and water hygiene.⁷ The study highlights the need for education on the appropriate timing of CF to ensure that children receive the necessary nutrients at the right developmental stage.

Inadequate quantity and inappropriate consistency are significant barriers to meeting the nutritional needs of children. Thin or watery foods, often given due to misconceptions about a child's ability to digest solid foods, fail to provide sufficient energy and nutrients.⁹

The WHO emphasizes that complementary foods should be "thick enough to stay on a spoon" and provided in sufficient quantities to meet the child's energy and nutrient requirements. The low adherence to these guidelines in the study population suggests a lack of awareness or practical knowledge among mothers.¹⁰ Addressing this issue requires not only education but also demonstrations of how to prepare and serve appropriate complementary foods.

The study identified several reasons for delayed or inappropriate CF practices. The most common reason, cited by 52% of mothers, was that the child "vomits everything" or refused to eat when CF was introduced. This highlights a lack of understanding about the gradual process of introducing CF and the need for patience and persistence. Other reasons included a lack of knowledge about when to start CF (30.5%), the belief that breast milk alone was sufficient (5.8%), advice from family elders to delay CF (5.2%), concerns about the child's ability to digest solid foods (4.6%), and the

misconception that teeth are necessary for eating solid foods (1.9%). These findings reveal deep-rooted misconceptions and cultural beliefs that influence feeding practices.¹²

The study found a significant association between maternal education and knowledge of CF ($p < 0.05$). Educated mothers were more likely to adhere to recommended CF practices, highlighting the importance of maternal education in improving child nutrition.¹³

The findings of this study have important implications for public health interventions aimed at improving CF practices. First, there is a need for targeted education programs to address the knowledge gap among mothers and caregivers. Education should be delivered through multiple channels, including antenatal and postnatal clinics, immunization sessions, and community outreach programs. Second, interventions should address the practical challenges faced by mothers, such as preparing appropriate complementary foods and dealing with children who refuse to eat.

Third, interventions should engage family members and community leaders to address cultural beliefs and practices that hinder appropriate CF.¹⁸

Finally, healthcare providers play a critical role in promoting appropriate CF practices. Routine healthcare visits, such as immunization sessions, provide an opportunity to educate mothers and monitor feeding practices. Healthcare providers should be trained to provide accurate and consistent information about CF and to address common misconceptions.^{16,17}

Future research should focus on longitudinal studies to assess the long-term impact of CF practices on child health and development. Additionally, qualitative studies could provide deeper insights into the cultural and social factors influencing CF practices. Interventions should be designed and evaluated to determine their effectiveness in improving CF practices and outcomes. Finally, research should explore the role of fathers and other family members in CF practices, as their involvement could significantly influence feeding behaviour.

The findings of this study have important policy implications.¹⁹ Governments and health organizations should prioritize maternal education and nutrition programs, particularly in low-resource settings. Policies should promote the integration of CF education into routine healthcare services, such as antenatal care, postnatal care, and immunization programs. Additionally, public health campaigns should aim to raise awareness about the importance of appropriate CF practices and address common misconceptions.²⁰

The study was conducted in a hospital setting, which may not be representative of the general population. The data on complementary feeding practices and reasons for

inappropriate practices were self-reported by mothers, which may be subject to recall bias or social desirability bias (mothers may provide answers they believe are expected or acceptable) and the study did not follow up with mothers to assess changes in feeding practices over time or the impact of interventions.

CONCLUSION

The study reveals a “practice gap” and “knowledge gap” in complementary feeding among mothers, emphasizing the need for education and proper guidance. Addressing these gaps through targeted interventions, especially during immunization sessions, and enhancing maternal education can significantly improve complementary feeding practices and outcomes in children.

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