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Original Research

Complementary Feeding Initiation Timing, Responsive Feeding Practices, and the Incidence of Underweight among 6-23 Months Children

Waktu Pertama Pemberian MPASI, Praktik Responsive Feeding, dan Kejadian Underweight pada Anak Usia 6-23 Bulan.

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Abstract: *Underweight remains a multidimensional public health problem among young children, influenced by various factors, including suboptimal feeding practices. Evidence on the role of complementary feeding initiation timing and responsive feeding in underweight remains inconsistent, particularly in low-resource settings. This study aimed to examine the association of complementary feeding initiation timing and responsive feeding practices with underweight among children aged 6–23 months. A cross-sectional study was conducted among 86 children under two years of age selected using cluster random sampling. The study was conducted in Tinambung District, Polewali Mandar Regency, West Sulawesi Province. Data were collected through structured interviews to assess feeding practices and anthropometric measurements to determine nutritional status. Underweight was defined based on weight-for-age indicators. The findings showed that neither the timing of complementary feeding initiation (p=0,160) nor responsive feeding practices (p=0,069) were significantly associated with underweight among children aged 6–24 months. These findings suggest that underweight in this population may be influenced by other underlying factors beyond feeding timing and caregiver practices. Comprehensive, multisectoral interventions addressing broader determinants of child nutrition are needed to effectively reduce underweight prevalence.*

Key word: Complementary Feeding Initiation Time, Responsive Feeding Practices, Underweight.

1. INTRODUCTION

Underweight remains a major public health concern among children under two years of age, particularly in low- and middle-income countries. It reflects both acute and chronic forms of malnutrition and is associated with increased risk of morbidity, mortality, impaired cognitive development, and reduced productivity later in life. The period from 6 to 23 months is considered a critical window for growth and development, as children transition from exclusive breastfeeding to complementary feeding. During this period, inadequate dietary intake and inappropriate feeding practices significantly contribute to growth faltering and undernutrition (1). Globally in 2024, 12.2% of children under five years old were underweight (2). Based on data from the Survei Status Gizi Indonesia (SSGI) 2024, 16.8% of children in Indonesia and specifically 25,9% in West Sulawesi were underweight (3).

Malnutrition is responsible for million deaths among children under five years of age each year. Two-thirds of these deaths are often associated with inappropriate feeding

practices during the first year of life. Despite the recommendation that infants should be exclusively breastfed during the first months of life, only about 35% of infants are exclusively breastfed during this period. As a result, complementary feeding is often introduced either too early or too late, leading to diets that are nutritionally inadequate and unsafe (4). The WHO framework provides an overview of the causes of malnutrition and classifies them into four main factors: household and family factors, inadequate complementary feeding practices, inadequate breastfeeding practices, and the presence of infections. In children, recurrent infections and poor breastfeeding practices—such as delayed initiation of breastfeeding, non-exclusive breastfeeding, and early introduction of complementary foods—can contribute to the occurrence of malnutrition (5). Complementary feeding is defined as the process that begins when breast milk alone is no longer sufficient to meet an infant's nutritional requirements, and therefore other foods and liquids are introduced alongside continued breastfeeding up to two years of age or beyond (6). The age of six months is recommended as the appropriate time to initiate complementary feeding, as breast milk alone is no longer adequate to fulfill the child's nutritional needs at this stage. The complementary feeding period represents a critical opportunity to prevent all forms of child malnutrition, including underweight, as nutritional problems often worsen during the feeding transition between 6 and 24 months of age (5,7,8).

According to the Global Strategy for Infant and Young Child Feeding, infants should be exclusively breastfed during the first six months of life to achieve optimal growth. Thereafter, to meet their nutritional needs, infants should receive adequate and safe complementary foods while breastfeeding continues up to two years of age (1). After the first six months of life, the nutrients provided by breast milk alone are no longer sufficient to meet the infant's nutritional requirements. This increases the risk of malnutrition unless appropriate complementary foods are introduced (9). A calm and supportive feeding environment is essential, and meals should ideally be shared with the family within a regular schedule. Caregivers are advised to avoid excessive fluid intake before and during meals, refrain from forcing or threatening the child to eat, and minimize distractions such as television, electronic media, or toys, so that the child can remain focused on eating (10). Despite the well-established importance of appropriate complementary feeding and responsive feeding practices for child nutrition, existing evidence remains inconclusive regarding their direct relationship with underweight, particularly in children aged 6–23 months. Many previous studies have primarily focused on stunting or overall malnutrition, while limited attention has been given specifically to underweight as an outcome (11–14). The aim of this study is to analyze the relationship between the timing of complementary feeding initiation and responsive feeding practices with the incidence of underweight among children aged 6–23 months.

2. METHODS

This study employed a quantitative design with a cross-sectional approach. The research was conducted in Tinambung District, Polewali Mandar Regency, West Sulawesi, in June-September 2025. The study population consisted of children aged 6–23 months. A total of 86 children were selected using a cluster random sampling technique, with eight clusters identified. The sample size within each cluster was determined proportionally. The inclusion criteria for this study were mothers who were willing to participate and provided written informed consent, had children aged 6–24 months, whose children did not have underweight status prior to six months of age, and who were able to read and write. The exclusion criteria included mothers

whose children were experiencing illness, particularly infectious diseases such as diarrhea, influenza, varicella, measles, or other infections, within one week prior to data collection, as well as children with physical disabilities. Children's nutritional status was assessed through anthropometric measurements using the weight-for-age indicator. Nutritional status was categorized into two groups: underweight, defined as a z-score ranging from < −3 SD to < −2 SD, and normal, defined as a z-score ranging from −2 SD to +1 SD (15).

Data on complementary feeding practices were collected using a structured questionnaire. The timing of complementary feeding initiation was classified as appropriate if introduced at six months of age, and inappropriate if introduced either too early (before six months) or too late (after six months). Responsive feeding practices were categorized appropriate if caregivers applied all five principles of responsive feeding, and inappropriate if at least one principle was not applied. The five principles of responsive feeding included: directly feeding the child or assisting the child in self-feeding, feeding slowly and patiently while encouraging the child to eat, responding appropriately to food refusal, providing feeding in a safe and supportive environment, and treating mealtime as an opportunity for learning and nurturing (10). The collected data were analysed using bivariate analysis with SPSS software. The Chi-square test was applied to examine the relationship between independent and dependent variables.

3. RESULTS

Table 1. Univariate Analysis Results of Study Participants

Variables	Frequency	
	n	%
Age (months)		
6-11	33	38,4
12-23	53	61,6
Sex		
Male	39	45,3
Female	47	54,7
Nutrition Status		
Normal	56	65,1
Underweight	30	34,9
Complementary Feeding Initiation Time		
Appropriate	70	81,4
Inappropriate	16	18,6
Responsive Feeding Practices		
Appropriate	6	7,0
Inappropriate	80	93,0
Total	86	100

A total of 86 children aged 6–23 months were included in this study. Based on table 1 most of the children were aged 12–23 months (61.6%), while 38.4% were aged 6–11 months. In terms of sex distribution, 54.7% were female and 45.3% were male.

Based on nutritional status, 65.1% of the children were classified as normal, whereas 34.9% were underweight. Regarding complementary feeding initiation, the majority of children (81.4%) received complementary foods at an appropriate time (6 months), while 18.6% experienced inappropriate timing (under or over 6 months) of complementary feeding initiation. In contrast, responsive feeding practices were largely inappropriate, with 93.0% of caregivers categorized as having inappropriate practices, and only 7.0% demonstrating appropriate responsive feeding practices.

Table 2. Association between Complementary Feeding Initiative Timing and Responsive Feeding Practices with Underweight in 6-23 Months Children

Variable	Nutritional Status				Total		*p-value*
	Normal		Underweight				
	n	%	n	%	n	%	
Complementary Feeding Initiative Timing							
Appropriate	48	68,6	22	31,4	70	100	
Inappropriate	8	50,0	8	50,0	16	100	0,160
Total	56	56,1	30	34,9	86	100	
Responsive Feeding Practices							
Appropriate	6	100	0	0	6	100	
Inappropriate	50	62,5	30	37,5	80	100	0,069
Total	56	65,1	30	34,9	86	100	

The relationship between complementary feeding initiation timing and nutritional status is presented in Table 2. Among children who received complementary feeding at an appropriate time, 68.6% had normal nutritional status, while 31.4% were underweight. In contrast, among those with inappropriate timing of complementary feeding initiation (under or over 6 months), 50.0% had normal nutritional status and 50.0% were underweight. Although a higher proportion of underweight was observed among children with inappropriate complementary feeding timing, the Chi-square test indicated that this relationship was not statistically significant ($p = 0.160$). The analysis of responsive feeding practices showed that all children (100%) whose caregivers practiced appropriate responsive feeding had normal nutritional status, with no cases of underweight reported in this group. Conversely, among children exposed to inappropriate responsive feeding practices, 62.5% had normal nutritional status, while 37.5% were underweight. Despite this notable difference in distribution, the association between responsive feeding practices and underweight was not statistically significant based on the Fisher Exact test ($p = 0.069$), although the result approached the threshold of significance.

4. DISCUSSION

This study examined the role of complementary feeding initiation timing and responsive feeding practices in relation to underweight among children aged 6–23 months. The univariate findings showed that a considerable proportion of children were underweight (34.9%), indicating that undernutrition remains a significant public health concern in the study area. The high proportion of inappropriate responsive feeding practices (93.0%) also highlights critical gaps in caregiver feeding behavior that may influence child nutrition outcomes.

The results of this study indicated that most children (81.4%) received complementary feeding at the recommended time (6 months). However, despite this relatively high proportion of appropriate initiation, underweight remained prevalent. This finding suggests that the timing of complementary feeding alone may not be sufficient to ensure optimal nutritional status. The bivariate analysis showed no statistically significant association between complementary feeding initiation timing and underweight ($p = 0.160$). Although children with inappropriate feeding initiation had a higher proportion of underweight (50.0%) compared to those with appropriate timing (31.4%), the difference was not statistically significant.

Introducing complementary foods too early can reduce breast milk intake and increase the risk of diarrhea and other infections (13). Conversely, delaying the introduction of complementary feeding may result in inadequate energy and essential micronutrient intake, particularly iron. Late initiation may also impair the child's acceptance of different food types and textures, thereby increasing the likelihood of a limited and monotonous diet (16). Research that conducted among mothers of children aged six months to two years identified several common reasons for the early introduction of complementary feeding, including perceived insufficient breast milk, the belief that additional food was necessary for the child's growth, advice from older family members regarding the timing of introducing semi-solid foods, and subsequent maternal pregnancy (17). Regarding responsive feeding practices, the present study found that most caregivers practiced inappropriate feeding (93.0%), indicating limited caregiver responsiveness during feeding. Although all children exposed to appropriate responsive feeding had normal nutritional status, the association between responsive feeding and underweight was not statistically significant ($p = 0.069$). However, the p-value approached statistical significance, suggesting a potential relationship that may not have been detected due to the limited sample size.

According to the Indonesian Ministry of Health Guidelines on Infant and Young Child Feeding (PMBA, 2021), responsive feeding practices begin by encouraging the child to eat from their own plate. As the child becomes accustomed to self-feeding, meals may be made more appealing through simple food presentation. The recommended duration of feeding is approximately 30 minutes and may be extended up to a maximum of 45–50 minutes if the child initially refuses to eat (10). Responsive feeding is a component of active feeding, in which parents or caregivers are actively engaged in appropriate behaviors during child feeding. According to recommendations from the Pan American Health Organization (PAHO) and the World Health Organization (WHO), caregivers practicing responsive feeding are encouraged to recognize and respond to children's hunger and satiety cues, avoid forcing children to eat, and treat mealtime as an opportunity for learning and interaction (1). The absence of a statistically significant association in this study may be explained by the multifactorial nature of underweight. According to the UNICEF conceptual framework, child undernutrition is influenced not only by feeding practices but also by underlying factors such as household food security, maternal education, sanitation, and access to health services. In addition, recurrent infections may reduce nutrient absorption and increase nutritional requirements, thereby contributing to underweight regardless of feeding practices (18).

Furthermore, the relatively small sample size may have limited the statistical power to detect significant associations. The borderline p-value observed in responsive feeding practices suggests that a larger sample size might reveal a statistically significant

relationship. This highlights the importance of conducting further studies with larger samples and more comprehensive variables to better understand the determinants of underweight in this population. although this study did not find statistically significant associations between complementary feeding initiation timing or responsive feeding practices and underweight, the observed trends suggest that suboptimal feeding practices may still contribute to poor nutritional outcomes. These findings emphasize the need for comprehensive nutrition interventions that address not only feeding timing and caregiver behavior but also broader determinants such as dietary quality, infection control, and household conditions.

5. CONCLUSION

In conclusion, this study found no statistically significant association between the timing of complementary feeding initiation or responsive feeding practices and the incidence of underweight among children aged 6–23 months. Although a higher proportion of underweight was observed among children with inappropriate feeding practices, these differences were not significant. The findings suggest that underweight in this population is likely influenced by multiple underlying factors beyond feeding timing and caregiver behavior, including dietary quality, infection, and broader socioeconomic conditions. Therefore, efforts to reduce underweight should adopt a comprehensive approach that addresses both feeding practices and the wider determinants of child nutrition.

CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest related to this study. This research was conducted independently without any financial or commercial relationships that could be construed as a potential conflict of interest.

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