

Association of Weaning Practice with Severe Acute Malnutrition in Children Presenting to the Nutritional Rehabilitation Unit

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Abstract: Appropriate timing of complementary feeding plays a critical role in child growth and nutritional status. Delayed or inappropriate weaning practices may contribute to severe acute malnutrition (SAM), a major cause of morbidity and mortality among children under two years of age, particularly in low-resource settings. **Objective:** To determine the frequency of severe acute malnutrition in children with early and late weaning practices presenting to a Nutritional Rehabilitation Unit. **Methods:** This cross-sectional study included 159 children aged 2–24 months presenting to a Nutritional Rehabilitation Unit. Early weaning was defined as the introduction of complementary foods before six months of age, while late weaning was defined as the introduction after six months from 21-12-2024 to 21-04-2025. Children with congenital anomalies, genetic disorders, neurological impairments, and those receiving treatment for severe acute malnutrition within the previous three months were excluded. All children were assessed for SAM based on standard anthropometric criteria. Data were analyzed using SPSS version 26. Associations were evaluated using appropriate statistical tests, with a p -value < 0.05 considered statistically significant. **Results:** The mean age of the children was 15.09 ± 5.18 months, and the mean weight was 9.41 ± 1.10 kg. Late weaning was observed in 110 children (69.2%), while early weaning was reported in 49 children (30.8%). The overall frequency of severe acute malnutrition was 46.5% ($n=74$). Among children with SAM, 77.0% ($n=57$) had a history of late weaning, whereas 23.0% ($n=17$) had early weaning ($p=0.04$). Severe acute malnutrition was significantly associated with lower weight category ($p = 0.002$), rural residence ($p = 0.002$), and lower parental education level ($p = 0.01$). **Conclusion:** Late weaning practice was significantly associated with a higher frequency of severe acute malnutrition. Additionally, lower weight category, rural residence, and lower parental education were significant risk factors. Strengthening caregiver education regarding appropriate complementary feeding practices may help reduce the burden of severe acute malnutrition.

Keywords: Severe Acute Malnutrition, Weaning Practices, Complementary Feeding, Child Nutrition

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Introduction

Weaning practices play a central role in determining children's nutritional status. Delayed complementary feeding is a well-recognized factor for childhood malnutrition. Evidence suggests that children with severe acute malnutrition (SAM) exhibit marked immaturity of the gut microbiota, highlighting the need for timely, appropriate nutritional interventions during early life (1, 2). The introduction of ready-to-use therapeutic foods (RUTFs) has significantly improved the management of SAM, underscoring the critical role of targeted nutritional interventions in treating severely malnourished children. Research has revealed that early initiation of weaning may negatively affect child health, strengthening the need for carefully timed and nutritionally adequate weaning practices to support optimal growth and long-term health outcomes (3, 4).

The effective management of severe acute malnutrition requires structured, well-designed therapeutic feeding programs, particularly in healthcare settings where capacity to care for critically ill children may be limited (5). Understanding the association between weaning practices and SAM patterns in children requires examining the overall burden of acute malnutrition. Studies reported a wide variation in the prevalence of acute malnutrition among hospitalized children, emphasizing the extent of this public health burden. SAM in early childhood has been related to 12.6% risk of long-term negative outcomes, comprising impaired cognitive Development, increased susceptibility to chronic diseases, and elevated mortality among children under five years of age (6, 7).

Poor weaning practices have only recently been recognized as a major factor in malnutrition, further underlining the significance of appropriate complementary feeding in infancy. Furthermore, early weaning has been associated with unfavorable health outcomes, highlighting the need to adhere to the weaning guidelines to safeguard children's future health.

Malnutrition is also associated with significant alterations in gut microbiota composition in children with SAM, characterized by increased abundance of Proteobacteria and reduced levels of Bacteroides. These alterations reflect the multifaceted interaction in intestinal microbial balance and nutritional status (8-10).

Most existing research on the association between weaning practices and SAM in children has been conducted in international settings, with comparatively little evidence from the local context. Examining local patterns is vital, as weaning practices and underlying factors contributing to SAM can vary significantly between regions. This study aims to fill this knowledge gap by examining the relationship between weaning practices and the occurrence of SAM in the target population, generating critical insights that can guide the design of context-specific policies for the prevention and management of childhood malnutrition.

Methodology

This cross-sectional study was conducted in the Department of Paediatrics, Lady Reading Hospital, Peshawar. Ethical approval was taken before commencing the study. The study was conducted from 21-12-2024 to 21-04-2025. The sample size for the study was 159, calculated using a previously reported SAM frequency of 28.2% (10), a 95% confidence interval, and a margin of error of 7%. A non-probability consecutive sampling technique was used.

Children aged 6 to 24 months, both genders, with early and late weaning practices were selected. Early introduction was defined as introducing complementary foods, liquids, or semi-solid foods to an infant before the age of 6 months, as per the World Health Organization (WHO) guidelines for optimal infant and young child feeding practices. Late feeding was defined as introducing complementary foods, liquids, or semi-solid foods



to an infant after the age of 6 months as per the World Health Organization (WHO) guidelines for optimal infant and young child feeding practices. Children with congenital anomalies, genetic disorders, neurological impairments, and those who received specialized nutrition intervention or management for SAM in the last 3 months were excluded.

Informed consent was taken from parents after explaining the purpose/risks, and benefits of the study. Basic demographics (age, gender, weight, parents' monthly income, educational level, socioeconomic status, weaning practice, and residential status) were recorded at the time of study inclusion. All children were screened for severe acute malnutrition, which was defined as when a child has at least one among the following criteria: Mid-Upper Arm Circumference (MUAC) < 115 mm, Weight-for-Height Z-score (WHZ) < -3 Z-scores, and Weight-for-Age Z-score (WAZ) < -3 Z-scores. The weight and height/length were measured using calibrated equipment, recorded to the nearest 0.1 kg and 0.1 cm, respectively, and averaged from two measurements. Clinical examinations were conducted to assess for bilateral pitting edema and other signs of malnutrition, and the mid-upper arm circumference (MUAC) was measured using a standardized tape. All anthropometric data, clinical findings, and MUAC measurements were recorded.

Data was analyzed with SPSS 26. Frequencies and percentages were presented for gender, educational level, socioeconomic status, weaning practice, residential status, and severe acute malnutrition. Mean ± SD were calculated for age, weight, and parents' monthly income. Severe acute malnutrition was stratified for age, gender, weight, parents' monthly income, educational level, socioeconomic status, weaning practice, and residential status. Post-stratification chi-square test was applied; p ≤ 0.05 was considered statistically significant.

Results

In the present study, 159 children were enrolled; their mean age was 15.09 ± 5.18 months. Their mean weight was 9.41 ± 1.10 kilograms. The mean monthly income of their parents was 32,457 ± 14,895 rupees. Male patients accounted for 92 (57.9%), while female patients accounted for 67 (42.1%) (Table 1). Regarding the feeding practices, early weaning was reported for 49 (30.8%) children. Late weaning was reported for 110 (69.2%) children (Figure 1). The prevalence of severe acute malnutrition (SAM) in the study was 74 (46.5%) (Table 2). The association between weaning practices and SAM was statistically significant. In children who started early weaning, the frequency of SAM was 17 (23%), and in those who started late weaning, it was 57 (77%) (P = 0.04). Children weighing

7 to 9.1 kg were significantly associated with SAM (P = 0.002). Lower education levels were also associated with SAM (P = 0.01). Patients from rural areas had a significantly higher frequency of SAM (P = 0.002) (Table 3)

Table 1: Demographics

Demographics		n	%
Gender	Male	92	57.9%
	Female	67	42.1%
Education status of parents	Uneducated	69	43.4%
	Primary	61	38.4%
	Higher	29	18.2%
Residential status	Urban	64	40.3%
	Rural	95	59.7%
Socioeconomic status	Low (Rs<25000)	84	52.8%
	Middle (Rs 25000-60000)	64	40.3%
	High (Rs >60000)	11	6.9%

Figure 1: Weaning practice

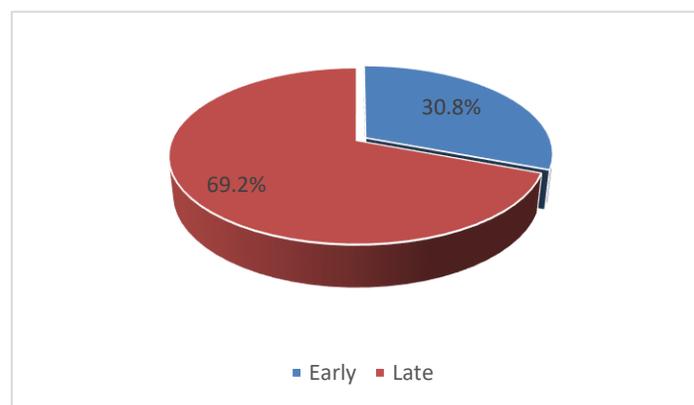


Table 2: Frequency of severe acute malnutrition

Severe acute malnutrition	n	%
Yes	74	46.5%
No	85	53.5%

Table 3: Association of severe acute malnutrition with weaning practice and demographics

Weaning practice and demographics		Severe acute malnutrition				P value
		Yes		No		
		n	%	n	%	
Weaning practice	Early	17	23.0%	32	37.6%	0.04
	Late	57	77.0%	53	62.4%	
Age groups (Months)	6 to 12	28	37.8%	26	30.6%	0.16
	13 to 18	30	40.5%	29	34.1%	
	19 to 24	16	21.6%	30	35.3%	
Weight (kg)	7 to 9.1	46	62.2%	32	37.6%	0.002
	> 9.1	28	37.8%	53	62.4%	
Gender	Male	44	59.5%	48	56.5%	0.70
	Female	30	40.5%	37	43.5%	
Education status of parents	Uneducated	38	51.4%	31	36.5%	0.01
	Primary	29	39.2%	32	37.6%	
	Higher	7	9.5%	22	25.9%	
Residential status	Urban	20	27.0%	44	51.8%	0.002
	Rural	54	73.0%	41	48.2%	
Socioeconomic status	Low (Rs<25000)	39	52.7%	45	52.9%	0.47
	Middle (Rs 25000-60000)	28	37.8%	36	42.4%	
	High (Rs >60000)	7	9.5%	4	4.7%	

Discussion

The association between weaning practices and severe acute malnutrition (SAM) is a critical pediatric health problem, especially in resource-limited settings. Several studies have suggested that late weaning, defined as the introduction of solids after 6 months of age, is associated with a higher risk of malnutrition. Parveen et al. found that a larger proportion of infants who were weaned at six months or later were underweight (59.8%) compared to those weaned earlier (51.3%) (11). Another study from India identified late initiation of complementary diet after six months as a notable independent risk factor for SAM, with an adjusted odds ratio of 6.645 (12). This finding was further supported by Iqbal et al., who reported a higher prevalence of malnutrition in infants who started late weaning (43.9%) compared to those weaned early (18.8%) (13).

Apart from timing, the quality and nature of complementary feeding are important. Multiple studies agree that inappropriate feeding practices, regardless of timing, are a primary factor in SAM. The lack of minimum dietary diversity has been associated with acute malnutrition, as demonstrated by Devi et al., who found that low dietary diversity was significantly associated with SAM (14). Similarly, bottle feeding and the administration of prelacteal feeds have been identified as notable risk factors (12). Mehmood et al. also noted that suboptimal complementary feeding practices influenced by cultural myths and a lack of maternal knowledge lead to childhood stunting and underweight in urban Pakistani settings (10). These findings emphasize that the introduction of foods alone is insufficient; the nutritional adequacy, safety, and frequency of meals are critical factors in a child's growth trajectory.

Socio-demographic factors further increase the risk of SAM. Low socioeconomic status and parental illiteracy are significant factors. Children from rural areas and low-income households are affected by SAM (14). Maternal education plays an important role; a higher educational level is associated with better adherence to recommended feeding guidelines and improved child nutritional status (1, 15). This creates a cycle where poverty and lack of education prolong poor feeding practices, leading to malnutrition, which in turn obstructs cognitive and physical development. Therefore, interventions must extend beyond nutritional education to address these broader factors.

The demographic profile of the present study showed a high proportion of parents with no formal education (43.4%) and a majority residing in rural areas (59.7%). Late weaning was observed in 69.2% of children and was significantly associated with SAM ($p=0.04$). This aligns with the findings of Deepak et al. and Iqbal et al., which support the notion that delaying the introduction of complementary foods beyond 6 months increases the risk of acute malnutrition (12, 13). The significant association between lower weight (7-9.1 kg) and SAM further validates the acute nutritional deficiency in these children.

The analysis also revealed that children from rural residences and those with uneducated parents had a significantly higher frequency of SAM. This aligns with Devi et al. and underscores the combined effect of geographical and educational disadvantages (14). The high frequency of SAM 46.5% in the present study is alarming and points to a severe public health burden.

Conclusion

In conclusion, the findings from the present study confirm that late weaning is significantly associated with severe acute malnutrition in children aged 6 to 24 months. The study also found that lower weight, low parental education, and rural residence are significant risk factors for severe acute malnutrition in this population. These findings suggest integrated public health strategies that combine targeted nutritional education on appropriate complementary feeding with broader efforts to improve parental literacy and rural livelihoods.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate (179.1/LRH/MTI)

Approved by the department concerned.

Consent for publication

Approved

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Conflict of interest

The authors declared no conflicts of interest.

Author Contribution

SH (Postgraduate Resident), AM (Associate Professor)

Contributed to study design, data collection, and initial manuscript drafting

Assisted in data acquisition, literature review, and manuscript editing
Performed statistical analysis and contributed to the interpretation of results

Helped in methodology development, data organization, and manuscript formatting

Contributed to patient recruitment, data entry, and results compilation

MK (Postgraduate Resident), SHS (Postgraduate Resident)

Assisted in referencing, proofreading, and final revisions of the manuscript

Guided study execution and critically reviewed the manuscript

Supervised the research, coordinated among authors, finalized the manuscript, and approved the final version

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

References

1. Ajmal S, Ajmal L, Ajmal M, Nawaz G. Association of malnutrition with weaning practices among infants in Pakistan. *Cureus*. 2022;14(11):e31018. <https://doi.org/10.7759/cureus.31018>
2. Appiah PK, Amu H, Osei E, Konlan KD, Mumuni IH, Verner ON, et al. Breastfeeding and weaning practices among mothers in Ghana: a population-based cross-sectional study. *PLoS One*. 2021;16(11):e0259442. <https://doi.org/10.1371/journal.pone.0259442>
3. Iddrisu I, Monteagudo-Mera A, Poveda C, Pyle S, Shahzad M, Andrews S, et al. Malnutrition and gut microbiota in children. *Nutrients*. 2021;13(8):2727. <https://doi.org/10.3390/nu13082727>
4. Labatjo R. Weaning and nutritional status of under-three children. *Food Res*. 2023;7(Suppl 5):31-37. [https://doi.org/10.26656/fr.2017.7\(S5\).9](https://doi.org/10.26656/fr.2017.7(S5).9)
5. Kangas ST, Marron B, Tausanovitch Z, Radin E, Andrianarisoa J, Dembele S, et al. Effectiveness of acute malnutrition treatment at health center and community levels with a simplified, combined protocol in Mali: an observational cohort study. *Nutrients*. 2022;14(22):4923. <https://doi.org/10.3390/nu14224923>
6. Dipasquale V, Cucinotta U, Romano C. Acute malnutrition in children: pathophysiology, clinical effects and treatment. *Nutrients*. 2020;12(8):2413. <https://doi.org/10.3390/nu12082413>
7. Salameh É, Morel F, Zeilani M, Déchelotte P, Marion-Letellier R. Animal models of undernutrition and enteropathy as tools for assessment of nutritional intervention. *Nutrients*. 2019;11(9):2233. <https://doi.org/10.3390/nu11092233>
8. Al Harthi H, Al Jufaili F, Al Ubaidani SA, Al Awaidy ST. Weaning practices impact factors and outcomes: cross-sectional study. *Int*

J Innov Res Med Sci. 2022;7(2):66-72.

<https://doi.org/10.23958/ijrms/vol07-i02/1350>

9. Jha PK, Shukla S, Acharya S. Trends and practices of weaning in infants across India: a comprehensive review. *J Family Med Prim Care*. 2024;13(7):2568-2575. <https://doi.org/10.4103/jfmpe.jfmpe.1744.23>

10. Mehmood R, Humayun KN, Saleem AF, Sherazi SA, Ali NA. Complementary feeding pattern and nutritional status of children. *J Coll Physicians Surg Pak*. 2023;33(7):775-778. <https://doi.org/10.29271/jcpsp.2023.07.775>

11. Parveen S, Perveen K, Afzal M, Gilani SA, Musadaq M. Association of malnutrition with the weaning practices among infants visiting pediatric medicine department of DHQ Hospital, Chakwal. *Punjab Univ J Zool*. 2020;35(2):203-206. <https://doi.org/10.17582/journal.pujz/2020.35.2.203.206>

12. Deepak DH. Inappropriate feeding practices as a risk factor for severe acute malnutrition in children aged between one month to five years: a case control study. *Int J Contemp Pediatr*. 2022;9(2):167-172. <https://doi.org/10.18203/2349-3291.ijcp20220088>

13. Iqbal A, Ali I, Ahmed Z. Association of malnutrition with weaning practices among infants in Pakistan. *J Gandhara Med Dent Sci*. 2023;10(3):51-54. <https://doi.org/10.37762/jgmds.10-3.483>

14. Devi RR, Puthenveetil HR, Singh CI. Prevalence of complementary feeding practices and its association with acute malnutrition among children aged 6 to 24 months in north-east India: a hospital-based cross-sectional study. *Int J Acad Med Pharm*. 2025;7(4):500-505. DOI not available.

15. Mkhize M, Sibanda M. A review of selected studies on the factors associated with the nutrition status of children under the age of five years in South Africa. *Int J Environ Res Public Health*. 2020;17(21):7973. <https://doi.org/10.3390/ijerph17217973>



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