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Influence of child feeding practices and selected basic conditioning factors on stunting in children between 6 and 24 months of age in Myanmar

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Abstract

Background: A cross-sectional predictive study was carried out to examine the influence of child feeding practices on stunting status of children between 6–24 months in Yangon Children Hospital, Myanmar. This study aimed to assess if dependent-care can influence stunting. **Methods:** Data were collected by anthropometric measurement from a total of 216 children between 6 and 24 months of age. For mothers, structured interview, demographic form, and infant child feeding index were used. Descriptive statistics, chi-square, and logistic regression were carried out. **Results:** One-fourth of participants exhibited a low score of infant child-feeding practices, whereas median and high score practice accounted for 39.82% and 34.72%, respectively. Only child feeding practice was shown significant association and predicted stunted children. Low score (0–5) was more likely to be stunted 15.45 times [OR 15.45, 95% CI; 5.58, 42.81] at $p = 0.00$ and a medium score (6–7) on the infant child feeding index was 4.55 times higher than a high score (8–9) on the infant child feeding index [OR 4.55, 95% CI; 1.72, 12.04] at $p = 0.02$. **Conclusion:** Child feeding practice is the only predictor of stunting status of children and intervention program for child feeding practices should be provided.

Keywords: child malnutrition, complementary feeding, growth disorder, stunting

Introduction

According to global targets set by the World Health Organization (WHO) for the nutrition of infants and young children, reducing the prevalence rate of stunting is the first priority target.¹ This target is to decrease stunting prevalence from 171 million in 2010 to around 100 million in 2025.¹ In 2017, 151 million (22.2%) children under the age of 5 years suffered from stunting.² Stunted children are those whose length/height is under -2 SDs from the WHO Child Growth Standards median for children of a similar age and sex.³ While the global average of stunting is 22.2%, the regional average of South-East Asia region is 33.0%.⁴ Among the South-East Asian countries, Myanmar is one of the nations with a high stunting prevalence.⁵ According to the Demographic and Health Survey (2015–2016), 37% of children under the age of 5 years in Myanmar were stunted.⁶ Compared with the global and regional prevalence rate, Myanmar has a high stunting rate.

Analysis of early development in children from 54 poor countries in Africa and South-East Asia showed that a fast decline in children's height-for-age Z-score less than 2 years of age shows no recuperation after 5 years of age. This finding demonstrated that the period from

conception to 24 months is a window period for the chance of intervention against stunting.⁷ Moreover, one study confirmed that inappropriate complementary feeding practice tends to increase the danger of stunting in children between 12 and 24 months of age. Therefore, to improve interventions during the initial 2 years of life (1000 days in early life), proper infant feeding practice is needed.⁸ A study was conducted in Dhaka which showed that feeding practices in infants and young children directly influenced the nutritional status (stunting) of children.⁹

In Myanmar, the technique of Infant and Young Child Feeding was created in 2003 and amended. Co-appointment meeting for audit and amendment of a 5-year system for Infant and Young Child Feeding (2011–2016) was directed in 2011 and has now been embraced. Hospital Nutrition Unit, Community Nutrition Center, and different intercessions for iron supplementation, micronutrient supplementation, and all-inclusive salt iodization program have been actualized to diminish undernutrition among children.¹⁰ The predominance of undernutrition, particularly stunting, is still high in Myanmar and is a general medical concern. It is distinctively interesting to study the predictive relationships of stunting among factors including child-

feeding practices, educational attainment of the mother, mother's height, the frequency of antenatal visits, birth weight of children, and gestational age. In a previous study in Myanmar, no information about child-feeding practices and educational attainment of the mother on stunting status was found.¹¹ However, there is much evidence related and predicted about stunting from many aspects and in many regions worldwide. A few studies have used the nursing theory to understand the phenomenon of stunting. Therefore, the study is needed to explore which factor distinctively predicts childhood stunting in Myanmar based on the nursing theory.

In this research, the Dependent Care Agency Concept in Orem's Self-Care Theory has been used as a metaphorical concept. Dependent-care varies according to the individual's abilities for providing care. The establishments for dependent-care include people who provide care for the dependent person. The theory of self-care is one of the constituent speculations of Orem's self-care deficit nursing theory. A theory of dependent-care is based on the information and knowledge of self-care theory. Like self-care, dependent-care has its causes in an individual's prerequisites for administrative care.¹² According to Orem, nutrition and promotion of human development are the universal self-care requisites. Babies need help in feeding (dependent-care) from their mothers (dependent-care agent) to get nutrition (self-care deficit of the dependent) to prevent stunting (health deviation of the dependent). Mothers can address these concerns. Child-feeding practices are the deliberate actions of the mother to meet the universal and developmental requisites of the children. Therefore, this theory is used in this study to assess if dependent-care can influence the deviation of the health of children, also known as stunting.

Methods

This study was a cross-sectional predictive design and conducted at Yangon Children's Hospital, Myanmar.

Population and sample. After adding the attrition rate of 20%,¹³ the sample of this study comprised 216 children, calculated by the method of Leblanc and Fitzgerald (2000),¹⁴ whose ages were between 6 and 24 months and their mothers who had been visiting the Out-Patient Department and the Immunizations Clinics of Yangon Children's Hospital for acute illness. Data were collected from the end of January 2018 to March 2018. The participants were selected by means of purposive sampling methods based on the inclusion and exclusion criteria; children between 6 and 24 months of age and their biological mothers who could communicate in Burmese and were willing to participate were included in the study. However, if the child and mother were in a critical condition during data collection, they were excluded from the study. Data were collected by means

of a structured interview with three instruments: (1) Demographic data assessment for mothers and children; (2) Infant child-feeding index¹⁵; (3) Anthropometric measurement of height and weight of children.

Infant child-feeding index is based on age-specific scoring system and composed of five parts; breastfeeding score (mother presently breastfeeding [yes/no]), bottle feeding score (the child was given a bottle in the previous 24 h [yes/no]), 24-h dietary diversity score (child received selected food groups in the past 24 h [yes/no]), 7-day food frequency score (number of days child received selected food groups in the past 7 days), and feeding frequency score (number of meals and snacks). The score of the index is in the range of 0–9. A higher score means better child-feeding practices. The scoring system varies according to the child's age because the nutritional needs of the child vary according to the child's age. Thus, it needs to compare child feeding practices, the scores are given equal weight.¹⁵

Reliability of the instrument. Test–retest reliability was evaluated in 30 mothers who had similar characteristics as the study objects. Test–retest reliability of the infant child-feeding index was 0.92 ($p < 0.01$).

Protection of human rights subject. This study was approved by the Ethical Review Committee for Research in Human Subjects, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Thailand (IRB number-MURA2017/801) and Department of Medical Research, Ministry of Health and Sports, Republic of Myanmar (ERC Number - 015817). The participation of subjects was voluntary, and they were selected as per the criteria for collection of samples. The researchers explained to the participants about the study before obtaining their consent and let them decide whether they wanted to participate or not. Personal data of the participants was kept confidential and the researcher only presented the findings.

Data collection. After getting the ethical clearance from IRB, the researcher contacted the Medical Superintendent and Nursing Superintendent of the Yangon Children Hospital. The researcher identified the sample according to the inclusion criteria and interviewed the mothers (approximately 10 participants per day), which lasted for 15–20 min and obtained their anthropometric measurements. The interview was held after the doctor's appointment. The researcher explained to the participants the research objective with a request for their participation. Code number was used instead of their name for maintaining the confidentiality of the subjects. When they agreed to participate in this study, the researcher assured them to sign in consent form. After signing the consent form, the researcher invited the mothers to a quiet room and used a structured interview, by the infant child-feeding index, to interview the mothers. For the

demographic data of the mothers and children, maternal and child health records and delivery records were used for confirmation of the data. For the anthropometric measurement of children, a length board with a fixed headboard, movable footboard, and standardized weight measures were used. The height of the child was measured to the nearest 0.1 cm and the weight of the child was measured to the nearest 0.1 kg. To get the accurate the weight measurement, made to show zero by the weight measure without any load before each measurement. During the interview, the researcher allowed the mothers to ask questions if they had doubts or wished to understand the questions better.

To find out the Z-score of length for the age of children, WHO anthropometric calculator version 3.2.2¹⁶ was utilized. After retrieving the Z-scores, the information was transferred to SPSS 18.0 (Statistical Package of Social Sciences) software program provided by the Mahidol University, Thailand. Descriptive statistical analyses were performed to define the characteristics of children and mothers, child-feeding practices, the prevalence of stunting status. Chi-square and logistic regression analyses were performed to determine the predictive power of child-feeding practices and selected basic conditioning factors on stunting children between 6 and 24 months of age. Significance of each test was set at $p < 0.05$.

Results

The total number of participants in this study was 216 pairs of mothers and their children. Based on characteristics of the mothers in the study, their mean age was found to be 30.24 years (range, 15–45), with 84.72% mothers being 150 cm or taller in height. While 21.76% of mothers were graduate and higher than graduate, 37.50% had studied till high school, 25.46% till

secondary level, 14.35% till primary level, and 0.93% were illiterate. Most of the mothers (98.14%) were married. Among all the mothers, 62.96% were housewives, 10.65% were unskilled workers, 12.50% were employed, and 13.89% were self-employed. Among all the mothers, 89.81% had received antenatal care four times or more (Table 1 and Table 3).

Regarding characteristics of children, the gender distribution of this study showed that 48.61% were males and 51.39% were females. Of all, the gestational age of 90.28% children was 37 weeks or more. Among the sample children, 20.37% were born by the emergency cesarean section, while 67.13% were born by normal delivery, and 12.50% were born by elective cesarean section.

Table 2. Characteristics of the study variables

Variables	Number	Percentage (%)
Height of Mother		
Greater and Equal to 150 cm	183	84.72
Less than 150 cm	33	15.28
Education Attainment		
Graduate and Above	47	21.76
High School Level	81	37.50
Secondary Level	55	25.46
Primary Level	31	14.35
Illiterate	2	00.93
The frequency of Antenatal Visits		
Equal and more than four times	194	89.81
Less than four times	22	10.19
Gestational Age		
Equal and more than 37 weeks	195	90.28
Less than 37 weeks	21	9.72
Birth Weight		
Equal and more than 2500 g	174	80.55
Less than 2500 g	42	19.45

Table 1. Demographic characteristics of the mothers (n = 216)

Items	Minimum	Maximum	Mean ± SD	Number	Percentage (%)
Age (years)	15	45	30.24 ± 5.70	-	-
Height of Mother (cm)	134	165	152.05 ± 5.46	-	-
Education (years)	-	16	9.70 ± 3.28	-	-
Antenatal Visit (Times)	-	12	6.65 ± 2.59	-	-
Marital status					
Divorced	-	-	-	2	00.93
Widowed	-	-	-	2	00.93
Married	-	-	-	212	98.14
Employment					
Housewife	-	-	-	136	62.96
Unskilled Worker	-	-	-	23	10.65
Employee	-	-	-	27	12.50
Self-Employed	-	-	-	30	13.89

Table 3. Demographic characteristics of the children (n = 216)

Items	Minimum	Maximum	Mean ± SD	Number	Percentage (%)
Child's Gender					
Male	-	-	-	105	48.61
Female	-	-	-	111	51.39
Mode of Delivery					
Elective Cesarean Section	-	-	-	27	12.50
Emergency Cesarean Section	-	-	-	44	20.37
Normal Delivery	-	-	-	145	67.13
Child's Age (months)	6	24	13.85 ± 5.31	-	-
Gestational Age (weeks)	28	42	38.61 ± 2.03	-	-
Birth Weight (g)	1643	4365	3012.07 ± 591.16	-	-
Weight of the child (kg)	4.90	12.00	08.21 ± 1.31	-	-
Height of the child (cm)	60	90	74.47 ± 6.08	-	-

Regarding their birth weight, nearly one-fifth of the children were less than 2500 gm. Mean weight of the children between 6 and 24 months was 8.21 kg (Table 2 and Table 3). Prevalence of stunting status revealed that 28.24% among 216 children were between 6 and 24 months of age (Table 4). Regarding child-feeding practices, 25.46% of the participants showed a low score of practice, 39.82% showed a median score practice, and 34.72% showed a high score practice. As regard to logistic regression, there was a significant association of child-feeding practices and stunting in children at $p < 0.05$. An infant with a low score for child-feeding practices was more likely to be stunted 15.45 times than one with a high score for feeding practices at $p = 0.00$ [OR 15.45, 95% CI; 5.58, 42.81]. Additionally, a medium score of the infant

child-feeding practices was 4.55 times higher than a high score of the infant child-feeding practices at $p = 0.02$ (OR 4.55, 95% CI; 1.72, 12.04). There was no significant association between stunted children and basic conditioning factors (education attainment of the mother, mother's height, frequency of antenatal visits, birth weight of children, and gestational age) (Table 5).

Table 4. Prevalence of stunting in children (n = 216)

Stunted Children	Frequency	Percentage (%)
Stunted	61	28.24
Non-Stunted	155	71.76

Table 5. Logistic regression analysis (n = 216)

Variables	Non-Stunted		Stunted		OR	95% CI		p
	n	(%)	n	(%)		Lower	Upper	
Infant Child Feeding Index								
High*	69	(31.95)	6	(02.78)	-	-	-	-
Medium	62	(28.70)	24	(11.11)	04.55	1.72	12.04	0.002
Low	24	(11.11)	31	(14.35)	15.45	5.58	42.81	0.000
Education Attainment of the Mother								
Graduate and Higher*	35	(16.20)	12	(05.55)	-	-	-	-
High School Level	59	(27.32)	22	(10.19)	00.95	0.38	02.43	0.941
Secondary Level	42	(19.44)	13	(06.02)	00.61	0.22	01.81	0.392
Primary	17	(07.87)	14	(06.48)	01.18	0.37	03.72	0.767
Illiterate	2	(00.93)	0	(0)	00.00	0.00		0.999
Mother's Height								
≥150 cm*	124	(57.41)	44	(20.37)	-	-	-	-
<150 cm	31	(14.35)	17	(07.87)	01.40	0.61	03.18	0.421
Frequency of Antenatal Visits								
≥4 times*	142	(65.74)	52	(24.07)	-	-	-	-
<4 times	13	(06.02)	9	(04.17)	02.16	0.72	06.42	0.165
Birth Weight of Children								
≥2500 g*	125	(57.87)	49	(22.68)	-	-	-	-
<2500 g	30	(13.89)	12	(05.56)	00.72	0.294	01.80	0.491
Gestational age								
≥37 weeks*	142	(65.74)	53	(24.54)	-	-	-	-
<37 weeks	13	(6.02)	8	(03.70)	01.46	0.46	04.62	0.511

*Reference group

CI = Confidence Interval for adjusted odds ratio (OR)

Discussion

According to this study, 28.24% of the studied children were stunted, which is less than the rate reported by the Myanmar Demographic and Health Survey (2015–2016).⁶ Compared with the global prevalence rate of stunting in children under the age of 5 years (22.9%), the prevalence rate shown in our study is higher.⁴ Regarding child-feeding practices, one-third of participants followed optimal feeding practices. In a survey conducted in 2015–2016, it was shown that only 16% children received the minimum acceptable diet,⁶ which indicates some improvement in the child-feeding practices in Myanmar.

This was a predictive study, based on the nursing theory, and was conducted to understand the role of predictors on stunted children between 6 and 24 months of age. Child-feeding practice is the only accepted predictor among all the predictors, education attainment of mother, mother's height, frequency of antenatal visit, birth weight of children and gestational age. The findings of this study are consistent with those of the other studies conducted in India,¹⁷ Nepal,¹⁸ Bhutan,¹⁹ and Indonesia.⁸ However, these findings were not consistent with those from a rural area in China. Infant child-feeding practices did not correlate with the Z-score of the length for age score of the children²⁰ because this study used the integrated infant child-feeding index, thus accentuating the variation.

Regarding breastfeeding, most mothers in this study were willing to breastfeed in spite of having to go to work. Misconception regarding breastfeeding among mothers in Myanmar is that sole breastfeeding of children 6 months or under could make them thirsty; thus, water is given to them. A previous study in Myanmar also showed that early introduction of complementary food is one of the predictors of stunting.¹¹ However, it does not provide information about which kind of food or drink was given to the child. A qualitative study regarding exclusive breastfeeding in Ayeyarwady Region in Myanmar showed that there was low adherence to exclusive breastfeeding, although the respondents were well informed about exclusive breastfeeding. This study also stated that the family members, including grandmothers, fathers, and mothers, considered that sole breastfeeding to the child was not sufficient. They commonly fed water and mashed rice to the child under 6 months. This study also stated that it was the mother's decision to feed her child supplementary food, and other family members supported the decision.²¹

Concerning bottle feeding, there were malpractices observed as well. Poor hygiene regarding the bottle to be used, using milk powder that is not suitable for the child, and feeding coffee or tea to the child were among the several malpractices observed. WHO has recommended

that the parents should not use a bottle that is difficult to clean and avoid feeding low nutrient drinks such as coffee, tea, and other sugary drinks.²²

With respect to the dietary diversity of the children's food in this study, most of the children were fed only rice, a little bit of salt and fat for the basic meal. Some mothers added chicken meat and eggs, while some added carrots or beans. WHO has recommended that the dietary diversity of children between 6 and 23 months of age should comprise at least four food groups to have better quality diets.²² Traditional misconceptions were also seen in some families. Some grandmothers believed that feeding meat could cause tapeworm-related infection or feeding vegetables could cause abdominal bloating in children.

Approximately half of the study participants between 6 and 24 months of age were given meals three times per day. Moreover, WHO recommends 2–3 meals for children aged between 6 and 8 months and 3–4 meals for those aged between 9 and 23 months.²² Thus, as per WHO, three meals per day are acceptable for children aged between 6 and 8 months, whereas those aged between 9 and 23 months require more meals. Also, most of the mothers believed that no food was suitable for sick children (6 months or older), except for breast milk. WHO recommends mothers to feed sick children softer, varied, appetizing, and favorite foods and to feed them more than usual and encourage them to eat more.²² A review of surveys and research studies in South Asia showed that child-feeding practices differed from the optimal. Children from South Asia are fed less frequently, with low quality and quantity complementary feedings because their caregivers are believed to be anorexic.²³ Infant and child-feeding practices in Myanmar should improve to meet the standards of child-feeding practices set by the WHO.

Educational attainment of mothers cannot predict the stunting in children between 6 and 24 months of age in Yangon Children's Hospital, Myanmar. These variations could be attributed to the mothers' knowledge on nutrition, and that complementary feeding is not similar to the educational status. Most of the participants (99.1%) in this study were literate and the setting of this study was in Yangon, the largest city of Myanmar. Mothers can easily access health care and attain knowledge from health care providers. It can be seen that mothers often visit the hospital to assess their child's health, suggesting that mothers displayed health-seeking behavior and autonomy for themselves and their children. One study in Bolivia showed that maternal education and the child's nutritional status were linked by the maternal household and community factors.²⁴ A study in Southwest Ethiopia was also showed that mother's autonomy and getting help from their spouse are associated with good nutritional status of children.²⁵ Mother's education could

not predict the stunting in children when the mother's autonomy was high and when she received support from family members to nurture the child.

There was no association of mother's height on stunting in children between 6 and 24 months of age in Yangon Children's Hospital. In a study in Bangladesh, it was shown that early food supplementation during pregnancy can mediate early childhood stunting.²⁶ This might be a reason for this result because the sample of this study showed getting the good coverage of antenatal care. This could be why the mother's height, if less than 150 cm, could not predict the stunting in children in this study.

This study also showed that there was no prediction of the frequency of antenatal visits (less than four times) on stunting in children between 6 and 24 months of age. This might be because of the almost all the mother in this study got antenatal care from health care provider and took the nutritional supplementation that was prescribed. This can be assumed that the samples from this study have the ability to consume the resources for health care from the community can be assumed. Therefore, there is no association and prediction between frequency of antenatal visits and stunting in children between the age of 6 and 24 months in Yangon Children Hospital.

This result revealed that there was no significant association of birth weight less than 2500 gram on stunting in children between 6 and 24 months of age. The feeding pattern can influence the child's nutritional status at the postnatal stage. Mothers who give birth to children with low weight should feed them more often and provide more care than the ones who give birth to children with normal weight. This would result in increased growth in children. A study in rural Bangladesh evidenced that no improvement was seen in stunted children between 6 and 24 months of age even when more quantity and quality of food was provided. But there was improvement in later life (24–59 months) over time.²⁷ One longitudinal prospective study also pointed out that the socioeconomic status of the family can prevent the decrease of growth in height of children born with intrauterine growth retardation and those prematurely born.²⁸

Moreover, gestational age less than 37 weeks could not predict stunting in children between 6 and 24 months of age in Yangon Children's Hospital. This result is also consistent with the result of one study done in agricultural regions of Mali at 2018; there was no significant association in bivariate analysis and multivariate analysis.²⁹ A community-based cohort study in Malawi also resulted that preterm was not associated with stunting but associated with wasting and underweight.³⁰ This might be due to the mother's awareness of child's health status and perception of mothers about their child's health status and preventive behaviors of mothers. Mothers

knew that their child was prematurely born and wanted to be healthy like other termed children. So, mothers gave extra care and nurture the child to prevent illness and infection and to grow normally.

This study could not present the data for the whole nation and could not provide complete information of factors predicting stunting in children because it used a purposive sampling method and was conducted in a tertiary hospital. Also, because the data collector or interviewer in this study was the researcher himself, the interpretation of the answers was believed to be consistent and accurate.

Conclusions

The stunting status is influenced by the feeding pattern. It recommends that nurses should find the ways to increase healthy child-feeding practices of mothers by focusing their assessment on the feeding practices of mothers and providing knowledge on nutrition to encourage appropriate infant child-feeding practices. A regular monitoring program is required to implement monitoring of infant and child growth and developmental stages in every health care setting in Myanmar.

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Conflict of Interest Statement

The authors declare no conflict of interest.

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