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Research Article

Feeding Practices and Nutritional Status among Children Under Five Years of Age in Sleman District, Yogyakarta, Indonesia

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Background and Objective: Previous studies have shown that the main factor affecting nutritional status among children aged 0-59 months is feeding practice. Better feeding practices have been shown to be essential for improving dietary intake and subsequently improving nutritional status. The aim of this study was to investigate the association between feeding practices and nutritional status among children under five years of age in Sleman District, Yogyakarta, Indonesia. **Materials and Methods:** Using the cross-sectional design, 185 children aged 7-59 months were included as subjects. The sampling frame was taken from the Health Demography Surveillance System (HDSS) of the Faculty of Medicine, Universitas Gadjah Mada, Indonesia. Anthropometric data (body weight and height) were measured to assess nutritional status and feeding practice was determined using a validated questionnaire. **Results:** The results reflected a high rate of severe and chronic malnutrition among subjects, in which the prevalence of underweight based on weight-for-age (WAZ) was 12.5%, stunting based on height-for-age (HAZ) was 39.5% and wasting based on weight-for-height (WHZ) was 5.4%. Most subjects had relatively good feeding practices in terms of breastfeeding practices (95.7%), complementary food feeding (70.8%), feeding behavior (64.3%) and feeding frequency of at least 3 times a day (78.9%). Complementary foods were introduced before 6 months of age in half (54.1%) of the subjects, indicating early interruption of exclusive breastfeeding. There was no association between feeding practices and nutritional status based on WAZ, HAZ and WHZ. **Conclusion:** In this study, feeding practice was not related to nutritional status among children aged 7-59 months. There remains a need to implement good feeding practices to achieve adequate food intake and improve the nutritional status of children.

Key words: Children under five, feeding practices, food intake, malnutrition, nutritional status, stunting, wasting

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

The 2014 Global Nutrition Report describes Indonesia as being ranked among the top 17 countries on a list of 117 countries that have malnutrition problems, including stunting and wasting, in children under the age of five¹. The current report shows that the heights of more than one third of children under five are below average and the prevalence of stunting at the national level was 37.2%². On the other hand, the problems of underweight and wasting in children under five are just as alarming with the national prevalences of 19.6% and 12.1%, respectively². This number could be biased, however, as the prevalence of toddlers who did not come to primary health facilities for weight monitoring in the last six months had increased from 25.5% in 2007 to 34.3% in 2013². In Yogyakarta Province, although the prevalence of malnutrition-related incidents among children under five were slightly lower than the national figures, i.e., 27.3% for stunting, 16.2% for underweight and 9.4% for wasting, there was an increased trend from the previous period of time. It was particularly evident for stunting, whose prevalence was 22.5% in 2010 and rose to 27% in 2013².

Under nutrition in children can result from suboptimal infant and child feeding practices, among other factors³. Several studies have confirmed that feeding practice is associated with stunting and nutritional status of children under five as one of the directly related factors^{4,5}. Optimal feeding practice also plays an important role in determining the growth and development of children under five. Toddlers with poor growth have high rates of morbidity and mortality and can experience motor and mental development delays⁶. Adequate complementary feeding entails feeding children aged between 6 and 23 months with foods from four or more food groups at least twice a day. Wasting and stunting typically accelerate between the ages of 6 and 23 months, the phase when complementary feeding is needed, partly because the child becomes increasingly independent and mobile and are thus exposed to environmental contaminants⁶. If malnutrition in children under the age of five continues to occur, it can affect one's intellectual performance, work capacity and health conditions at a later age. Stunting in toddlers may become a risk factor for obesity and metabolic diseases such as diabetes and hypertension during adulthood⁷. Identifying risk factors by looking at feeding practice as the cause of malnutrition is expected to provide information on the appropriate intervention or prevention actions. There is strong evidence that the promotion of appropriate complementary feeding practices reduces the incidence of stunting and leads to better health and growth outcomes⁸.

As an effective intervention strategy to combat malnutrition, the World Health Organization (WHO) and the United Nation's Children Fund (UNICEF) recommended the introduction of adequate complementary foods at 6 months with continued breastfeeding until 2 years of age or older⁹. Understanding the factors associated with complementary feeding practices is important to support governments and their partners in designing and implementing programs to prevent child undernutrition through the promotion of nutritious complementary feeding. The aim of this study was to find an association between feeding practices and nutritional status among children aged 7-59 months in Sleman District, Yogyakarta, Indonesia.

MATERIALS AND METHODS

This was an analytical observational study with a cross-sectional design that was conducted in Sleman District, Yogyakarta Province during February of 2016. This study was a part of research entitled "The Association of Food Household Security and Demographic Factors with Prevalence of Stunting in Toddlers in Sleman (Indonesia)". The sampling frame was taken from the Health and Demographic Surveillance System (HDSS), a survey undertaken by the Faculty of Medicine, Universitas Gadjah Mada Indonesia from 2014-2015. This study received permission from the ethics committee of the Faculty of Medicine, Universitas Gadjah Mada, as well as approval from research respondents on the principle of autonomy, confidentiality, anonymity and beneficence.

The study population was toddlers who lived in Sleman areas, while subjects were toddlers who fulfilled the inclusion criteria, i.e., were aged from 7-59 months, were participants in the HDSS, lived in Sleman for 6 months consecutively, whose weight and height were able to be measured and whose parents were willing to participate by signing the informed consent form. Exclusion criteria were toddlers with caregivers who did not live at the same address as the participant and who were unable to meet the researchers, as well as toddlers who were admitted to the hospital. The participants came from 6 subdistricts, including Moyodan, Minggir, Turi, Tempel, Seyegan and Godean, all of which were purposively selected because they were used as survey blocks in the HDSS. A total of 185 toddlers participated in this study and were recruited through total sampling.

The anthropometric data were collected by measuring body weight (kg) and body height (cm) to obtain nutritional status indicators: weight according to height (WHZ), weight according to age (WAZ) and height/length according to age

(HAZ). Body weight was measured using SECA to the nearest 0.01 kg and height was measured using a microtoise to the nearest 0.1 cm. The measurement was plotted on a standardized growth chart from the 2010 version of the Ministry of Health guidelines¹⁰.

The feeding practice questionnaire consisted of 12 items covering 4 variables in terms of breastfeeding practice (breastfeeding and duration) that were divided into 3 categories (1-6 months or exclusive breastfeeding, 7-12 months and 13-24 months); complementary food feeding practice that reflected the age of complementary feeding (<6 months, 6 months and >6 months) and formula milk feeding (<6 months, 7-12 months and >12 months); feeding behavior that consisted of suggesting for children to eat (well suggestion and ignored it or forced it), food controlling, measuring meal portion, balanced diet feeding and snacking time, with 2 categories for each question, 'yes' for always and often (1-2×/day) and 'no' for never; and frequency of feeding (frequency of meal time), which was categorized into 2 groups: 1-2×/day and ≥3×/day.

All data were analyzed using statistical software quantitatively by univariate, bivariate and multivariate analysis. The statistical tests used were chi-square (χ^2) and multiple linear regression with a confidence interval (CI) of 95%.

RESULTS

Characteristics of participants: Table 1 shows the characteristics of the participants. The nutritional status among the majority of participants was well nourished (84.86%) based on the WAZ index and normal (88.11%) according to the WHZ index. In this study, toddlers who had an HAZ index of less than -2 SD (severe stunting and stunting) were categorized as stunting. Hence, 39.46% of toddlers were classified as stunting.

Feeding practices of children under five: Table 2 shows that approximately 50% of participants were assumed to exclusively breastfeed; the duration of breastfeeding was 18-24 months, the age of complementary feeding initiation was less than 6 months, the age of fruits/porridge feeding initiation and the age of fluffy food feeding initiation was 7-12 months and the age of formula milk feeding initiation was older than 12 months. Most caregivers performed food control practices, yet they were persuasive in making toddlers eat. Most of them never performed balanced diet feeding but provided snacks and fed the children 3 times per day on average.

Table 1: Characteristics of participants

Characteristics	No.	Percentage
Gender		
Male	99	53.50
Female	86	46.50
Age		
7-11 months	13	7.00
1-3 years	37	20.00
4-5 years	135	73.00
Birth weight		
<2.5 kg	15	8.10
>2.5 kg	170	91.90
Birth length		
<48 cm	76	41.10
>48 cm	109	58.90
Nutritional status		
Weight for age (WAZ)		
Severe undernutrition (<-3 SD)	1	0.55
Mild undernutrition (-3 up to <-2 SD)	22	11.89
Well-nourished (-2 up to +2 SD)	157	84.86
Over-nutrition (>+2 SD)	5	2.70
Height for age (HAZ)		
Severe stunting (<-3 SD)	23	12.43
Stunting(-3 up to <-2 SD)	50	27.03
Normal(-2 up to +2 SD)	103	55.68
Tall(>+2 SD)	9	4.86
Weight for height (WHZ)		
Severe wasting (<-3 SD)	2	1.08
Wasting(-3 up to <-2 SD)	8	4.32
Normal (-2 up to +2 SD)	163	88.11
Obese(> +2 SD)	12	6.49

Table 2: Feeding practice

Variables	No.	Percentage
Duration of breastfeeding		
1-6 months	32	17.3
7-12 months	16	8.6
13-24 months	137	74.1
Age of complementary feeding		
<6 months	100	54.1
6 months	70	37.8
>6 months	15	8.1
Age of formula milk feeding		
<6 months	1	0.5
7-12 months	86	46.5
>12 months	98	53.0
Food controlling		
No	86	46.5
Yes	99	53.5
Suggesting children to eat		
Ignored it	37	20.0
Well suggestion	148	80.0
Measuring children meal portion		
No	124	67.0
Yes	61	33.0
Balanced diet feeding		
No	103	55.7
Yes	82	44.3
Snacking time		
No	12	6.5
Yes	173	93.5
Frequency of meal time		
1-2×/day	39	21.1
≥3×/day	146	78.9

Association between feeding practices and nutritional

status: Table 3 shows that there was no association between feeding practice behaviors and nutritional status based on WAZ, HAZ and WHZ indices ($p>0.05$). Likewise, each item in all variables of feeding practices (duration of breastfeeding, age of formula milk feeding, food control, suggestion to eat, meal portion measurement, balanced diet, snacking time and frequency of meal time) had no association with nutritional status ($p>0.05$) (Table 3).

DISCUSSION

This study emphasized the importance of optimal feeding practice for children under five in the forms of breastfeeding, complementary feeding and overall feeding practices. Optimal infant feeding practice is an important factor in determining the growth and development of a child. For healthy mothers, exclusive breastfeeding of infants for up to 6 months is recommended¹¹. At this time, when breast milk is no longer sufficient to meet the nutritional requirements of the child, especially for energy and micronutrients, the complementary feeding process is expected to begin.

With regard to feeding practice, despite most ($>90\%$) subjects having good feeding practice in terms of breastfeeding, for complementary food feeding practice, more than 50% of caregivers began complementary feeding with foods such as fruits, porridge and fluffy food to their children before 6 months of age, indicating early interruption of exclusive breastfeeding. In healthy infants, beginning complementary feeding must be delayed until 6 months, as the WHO recommends exclusive breastfeeding for this period to confer several benefits to the infant and mother¹². Studies have demonstrated that early introduction to solid foods is a risk factor for infection, early cessation of breastfeeding and increased consumption of fatty or sugary foods at 1 year of age¹³. In introducing complementary foods, feeding behavior of mothers change and mothers and/or caregivers adopt various feeding practices that may not comply with standards for optimal infant feeding¹⁴.

In this study, analysis of feeding behavior variables showed that more than 50% of caregivers have effective ways to persuade their children to have meal but they never thoroughly measure the meal portion and hardly provide balanced nutrition in the meal. More than 70% of caregivers routinely give meals 3 times a day and permit snacking time. Some common practices by mothers during the complementary feeding period differ based on the types of food given to infants and the adequacy and frequency of

feeding. Food restrictions due to cultural practices, unhygienic bottle feeding practices, food handling/preparation and responsive breast feeding are also issues of concern during the complementary feeding period for the child¹⁵.

A previous study conducted elsewhere demonstrated that the determining factors associated with appropriate complementary feeding practices of children aged 6-23 months included higher maternal and paternal education, better household wealth, exposure to media, adequate antenatal and postnatal contact, child's sex and age, institutional delivery, low parity, maternal occupation, urban residence, knowledge and frequency of complementary feeding and receiving feeding advice and immunizations¹⁶.

In the current study, the prevalence of stunting (39.5%) was higher than the national and provincial figures (37.2 and 27%, respectively) as described in the Basic Health Research Report 2013 by the Ministry of Health (MoH)². A study in Ethiopia found that as many as 17.5, 22.9 and 19.5% of infants and young children had muscle wasting and were stunted and underweight respectively¹⁷. The differences might be attributed to other factors influencing nutritional status, such as socioeconomic status, income to access food, maternal education, recurrent infection and use of antenatal care.

There was no association between feeding practice and nutritional status based on WAZ, HAZ and WHZ in the current study. It was observed that breastfeeding practice was only associated with muscle wasting and stunting but not underweight. Continued and frequent breastfeeding also protects child health and well-being by reducing the child's risk of morbidity and mortality in disadvantaged populations. Moreover, non exclusively breastfed children in the first 4 months had a 3.95-times higher incidence of underweight and thereafter, to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years or more¹⁸. It is generally recognized that the "window of opportunity" for reducing stunting is the first 1,000 days from pregnancy to a child's second birthday. Therefore, infant and young child feeding practices, especially a duration of breastfeeding up to 2 years of age, might correspond to children's nutritional status.

Generally, the risk of malnutrition in the first 2 years of life has been directly linked with poor breastfeeding and complementary feeding practices of mothers together with a high rate of infectious diseases¹⁹. Appropriate breastfeeding and complementary feeding practices are considered fundamental to children's survival, growth and development²⁰. Wasting, stunting and underweight increased slightly among toddlers aged 7-11 months to toddlers aged 4-5 years.

Table 3: Association between feeding practice and nutritional status

Variables	Weight for age (WAZ)			Height for age (HAZ)			Weight for height (WHZ)				
	Undernutrition	Well-nourished	Over-nutrition	Stunting	Normal	Tall	Wasting	Normal	Over weight / Obese		
	No. Percentage	No. Percentage	No. Percentage	No. Percentage	No. Percentage	No. Percentage	No. Percentage	No. Percentage	No. Percentage		
Duration of breastfeeding											
1-6 months	3 9.4	28 87.5	1 3.1	11 34.4	19 59.4	2 6.3	4 12.5	26 81.3	2 6.3	0.285	
7-12 months	0 0.0	16 100.0	0 0.0	2 12.5	14 87.5	0 0.0	0 0.0	15 93.8	1 6.3		
13-24 months	20 14.6	113 82.5	4 2.9	60 43.8	70 51.1	7 5.1	6 4.4	122 89.1	9 6.6		
Age of formula milk feeding											
< 6 months	13 13.0	84 84.0	3 3.0	39 39.0	56 56.0	5 5.0	4 4.0	90 90.0	6 6.0	0.720	
7-12 months	8 11.4	60 85.7	2 2.9	28 40.0	38 54.3	4 5.7	6 8.6	58 82.9	6 8.6		
>12 months	2 13.3	13 86.7	0 0.0	6 40.0	9 60.0	0 0.0	0 0.0	15 100.0	0 0.0		
Food controlling											
No	11 12.8	72 83.7	3 3.5	36 41.9	47 54.7	3 3.5	5 5.8	76 88.4	5 5.8	0.692	
Yes	12 12.1	85 85.9	2 2.0	37 37.4	56 56.6	6 6.1	5 5.1	87 87.9	7 7.1		
Suggesting to eat											
Ignored it	6 16.2	30 81.1	1 2.7	16 43.2	20 54.1	1 2.7	2 5.4	33 89.2	2 5.4	0.832	
Well suggestion	17 11.5	127 85.8	2 2.7	57 38.5	83 56.1	8 5.4	8 5.4	130 87.8	10 6.8		
Measuring meal portion											
No	16 12.9	104 83.9	4 3.2	47 37.9	72 58.1	5 4.0	8 6.5	107 86.3	9 7.3	0.878	
Yes	7 11.5	53 86.9	1 1.6	26 42.6	31 50.8	4 6.6	2 3.3	56 91.8	3 4.9		
Balanced diet feeding											
No	11 10.7	89 86.4	3 2.9	45 43.7	54 52.4	4 3.9	6 5.8	88 85.4	9 8.7	0.419	
Yes	12 14.6	68 82.9	2 2.4	28 34.1	49 59.8	5 6.1	4 4.9	75 91.5	3 3.7		
Snacking time											
No	2 16.7	10 83.3	0 0.0	4 33.3	8 66.7	0 0.0	1 8.3	9 75.0	2 16.7	0.452	
Yes	21 12.1	147 85.0	5 2.9	69 39.9	95 54.9	9 5.2	9 5.2	154 89.0	10 5.8		
Frequency of meal time											
1-2 X/day	5 12.8	33 84.6	1 2.6	17 43.6	19 48.7	3 7.7	3 7.7	35 89.7	1 2.6	0.207	
>=3 X/day	18 12.3	124 84.9	4 2.7	56 38.4	84 57.5	6 4.1	7 4.8	128 87.7	11 7.5		

*significant at p<0.05

As breastfeeding decreases and complementary feeding increases and as the infant ages and the demands for energy and nutrients increase, the quality of complementary foods offered may not be adequate to maintain the good nutritional status the child acquired earlier when breastfeeding was mainly offered with little complementary foods²¹. Children who received the minimum meal frequency were less stunted than children who did not receive the minimum meal frequency²². A very weak association between feeding frequency and stunting and underweight was observed in Ethiopia²³. However, another study observed an association of feeding frequency with underweight but not with stunting²⁴.

Strength and limitation of the study : The strength of this study is that considering multiple contributing factors that affect child nutrition may help to use limited resources more effectively and efficiently. However, the limitations of this study include the cross-sectional study design that does not allow for the identification of a cause-and-effect relationship between the dependent and independent variables. The other limitation of the study is that it was performed in rural areas, so the results may not be representative of population living in the urban or suburban areas.

CONCLUSION

There is no association between feeding practice and nutritional status based on WAZ, HAZ and WHZ. Most caregivers or mothers are in the good category of feeding practices. Interventions to improve dietary diversity, enforce breastfeeding practices and encourage the timely initiation of complementary feeding are important to reduce undernutrition in Sleman District, Yogyakarta, Indonesia. There is a need to establish and strengthen intersectoral collaboration to examine the possibilities of increasing appropriate complementary feeding practices based on the three indicators. Finally, quality counselling of mothers and caregivers and appropriate behavioral change communication to other family and community decision-makers are essential for improving infant and young child feeding practices with special emphases given to poorly educated mothers with toddlers.

SIGNIFICANCE STATEMENT

This study identified the possible relationship between feeding practices performed by mothers or caregivers with children under five and nutritional status based on Z-score, which can be beneficial for evaluating feeding practice performance in toddlers. This study will help researchers

uncover the critical area of toddlers' growth evaluation through feeding practice performance that many researchers were not able to explore. Thus, a new theory on these micronutrient combinations and possibly other combinations, may be developed.

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